Adams, Karen K NAE

From: Jed Thorp [jthorp@cleanwater.org]
Sent: Thursday, February 24, 2005 2:55 PM
To: Energy, Wind NAE; mepa@state.ma.us; pdascombe@capecodcommission.org
Subject: Cape Wind comments

0004467

Please disregard yesterday's e-mail, and file the attached comments on behalf of Clean Water Action and the Regional Environmental Council, jointly.

Jed Thorp, Energy Campaign Organizer
Clean Water Action
36 Bromfield St., Suite 204
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----- Original Message -----
From: Jed Thorp
To: wind.energy@usace.army.mil ; mepa@state.ma.us ; pdascombe@capecodcommission.org
Sent: Wednesday, February 23, 2005 5:49 PM
Subject: Cape Wind comments attached

Attached are Clean Water Action's comment regarding the Army Corps of Engineers DEIS on the Cape Wind energy project.

Jed Thorp

Jed Thorp, Energy Campaign Organizer
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Comments to the U.S. Army Corps of Engineers
Regarding the Draft Environmental Impact Statement (DEIS)
Pertaining to the Cape Wind Energy Project

On behalf of Clean Water Action, Boston, MA and the
Regional Environmental Council, Worcester, MA

I. Introduction

We are pleased to have the opportunity to submit these written comments on the Army Corps of Engineers' (ACE) Draft Environmental Impact Statement (DEIS) for the proposed Cape Wind energy project. Although we took the opportunity to give oral testimony at the December 16, 2004 public hearing in Cambridge, these written comments should be viewed as Clean Water Action's the Regional Environmental Council's formal comments.

Clean Water Action is a member-based non-profit environmental and public health advocacy organization. Since 1997, Clean Water Action has helped lead a broad statewide coalition to press for the clean up of the state's oldest and dirtiest fossil-fueled power plants, with a particular focus on the public health impacts of power plant pollution. We have also been active in pressing for more renewable energy production both in the state and in the region. The Regional Environmental Council has been a strong ally of Clean Water Action's in working on these issues, and in working to promote renewable energy in the Worcester, Massachusetts area.

We are generally pleased with the DEIS that the Army Corps of Engineers has written. Although there are portions of the DEIS that we feel require more detail, we feel that – based upon the information provided in the current DEIS – the Cape Wind project should be permitted to go forward.

II. Health Benefits of the Cape Wind Project

Although we feel that the DEIS focused too much on the potential negative environmental impacts of the Cape Wind project, we were pleased that one of the most important environmental benefits – improved air quality and subsequent public health benefits – was addressed. It is important when assessing the impacts of an individual proposed energy project to begin by taking a look at the larger regional energy picture.

Currently, the New England region receives approximately 60% of its electricity from the burning of fossil fuels such as natural gas, oil and coal. The dirtiest of these fuels – coal and oil – are responsible for hundreds of premature deaths and thousands of unnecessary illnesses each year, according to several public health analyses over the past 8 years. Some of the more relevant studies on the health impacts of power plant pollution include, but are not necessarily limited to:

A. Reports and Research on the Health Impacts of Power Plant Pollution

<u>The Importance of Population Susceptibility for Air Pollution Risk Assessment: A Case Study of Power Plants Near Washington, DC</u>
<u>Harvard School of Public Health</u>

Summary: Based on a May 17, 2002 briefing before the U.S. Senate Environment and Public Works Committee by Harvard's Dr. Jonathan Levy, this summary describes results of a study undertaken by a team of researchers from Harvard School of Public Health to, in part, estimate the

health risks of five power plants in the Metropolitan Washington D.C. area. In the study (published in Environmental Health Perspectives, 2003) researchers estimate that over 250 premature deaths per year are associated with fine particulate matter air pollution from five power plants in Washington D.C., Maryland and Virginia. These plants are: Benning, Chalk Point, Dickerson, Possum Point and Potomac River. Disadvantaged groups were found to be especially vulnerable to air pollution; while only 25 percent of the population studied has less than a high school education this group suffers approximately half of the mortality attributed to the plants.
www.cleartheair.org/reports/dc_study.pdf

Association of Particulate Matter Components With Daily Mortality and Morbidity in Urban Populations
Health Effects Institute
August 1, 2000

Summary: Researchers at the Health Effects Institute have reconfirmed the relationship between premature death and fine particulate matter originally demonstrated in the nation's two most important particulate matter and mortality studies, the Harvard Six Cities Study and the American Cancer Society Study (ACS). The two landmark studies were a primary basis for the U.S. EPA's actions in 1997 establishing a national ambient air quality standard for fine particulate matter. The Six Cities Study was a prospective long-term study, to examine chronic (long-term) health effects of air pollution. The ACS study was a larger study, encompassing cities throughout the United States, with more statistical strength. Both studies were fully reanalyzed by HEI after industry called the original methods into question. Results of the reanalysis vindicate both studies and confirm the robust quality of the original data and analysis. Results from the reanalyzed Harvard Six Cities Study, which tracked 8,111 adults in six cities in the Northeast and Midwest United States for 14 years, show a 28% higher chance of premature death due to particulate matter between the most polluted and least polluted cities. The reanalysis of the ACS study, which originally tracked 552,138 adults in 154 cities in all states from 1982-1989, found an 18% higher risk. The strength of the HEI reanalysis counters industry's arguments that further research is needed before control strategies for particulate matter can be implemented. Such a delay would cost thousands of lives annually.
www.healtheffects.org/Pubs/Lippmann.pdf

Lung Cancer, Cardiopulmonary Mortality and Long-Term Exposure to Fine Particulate Air Pollution
C. A. Pope, et. al.
Journal of the American Medical Association
Vol. 287, no 9. - March 6, 2002

Summary: In a landmark study, researchers at the American Cancer Society (ACS) continued their study of fine particle pollution's effects on human health. The study tracked nearly a half-million individuals in 116 metropolitan areas across America for sixteen years. Researchers found that people living in the most polluted cities have an approximate 12 percent increased risk of cardiopulmonary death over those living in the cleanest areas of the country. Similarly for lung cancer there is an approximate 16% increased risk for those living in the more polluted cities. These results persisted after controlling for body weight, smoking and a number of other important factors. For comparison, living in a polluted city is akin to long–term exposure to second-hand cigarette smoke or moderate obesity.
www.jama.ama-assn.org/cgi/content/abstract/287/9/1132

Asthma in exercising children exposed to ozone: a cohort study
McConnell et. al.
The Lancet
Vol. 359. – February 2, 2002.

Summary: A decade long study of children conducted by the University of Southern California concluded that new cases of asthma are associated with heavy exercise in California communities with high concentrations of ozone. The study compared newly diagnosed asthma cases in 3,535 children tracked over a five-year period in 12 Southern California communities. The researchers showed that children in high ozone communities who played three or more sports developed asthma at a rate three times higher than children in low ozone communities. Although scientists have known for some time that smog can trigger attacks in asthmatics, this study presents some of the first evidence that ozone may cause asthma.
www.niehs.nih.gov/centers/2002News/usc-asma.pdf

Increased Particulate Air Pollution and the Triggering of Myocardial Infraction
Peters et. al.
Circulation
v. 103. - June 12, 2001.

Summary: According to this time-series study, short term exposures to elevated levels of fine particles (PM 2.5) increases the risk of heart attacks in at-risk persons for up to one day following exposure. Researchers interviewed 772 Boston-area patients recovering from heart attacks and found that the onset of their symptoms correlated with times of high daily pollution. The study, conducted between 1995 and May 1996, was one of the first of its kind to document the link between short-term exposure to air pollution and heart attacks. The study found that elevated levels of fine particulate matter increases the risk of heart attack by 48-69 percent after being exposed to particulate matter pollution for anywhere from 2 to 24 hours. Murray Mittleman, M.D., director of the cardiovascular epidemiology at Beth Israel Deaconess, and a coauthor of the study concluded, "As levels of air pollution went up, the risk [of heart attack] went up."
www.respiratoryreviews.com/sep01/rr_sep01_pollution.html

Effect of Air Pollutants on Acute Stroke Mortality
Hong et. al.
Environmental Health Perspectives
Vol. 110, no. 2 – February 2002.

Summary: A team of four Korean institutions and the Harvard School of Public Health has concluded that: " fine particulate matter and gaseous pollutants are significant risk factors for acute stroke death and that the elderly and women are more susceptible to the effect of particulate air pollutants." Researchers found that deaths from stroke in Seoul between 1995 and 1998 increased with rising concentrations of PM10, ozone, sulfur dioxide and nitrogen dioxide (NOx)—all common power plant emissions. The two most susceptible groups to the effects of these air pollutants were the elderly and women.
http://ehpnet1.niehs.nih.gov/docs/2002/110p187-191hong/abstract.html

Inhalation of Fine Particulate Air Pollution and Ozone Causes Acute Arterial Vasoconstriction in Healthy Adults
R. D. Brook, et. al.

Circulation
Vol. 105, p 1534-1536. - April 2, 2002.

Summary: This experimental study found that blood vessels in healthy lungs became constricted after exposure to polluted air. In the study, 25 people inhaled elevated concentrations of fine particulates plus ozone for two hours. Dr. Robert Brook, lead author, described this exposure as similar to those found in urban areas during peak air pollution times, such as rush hour. After exposure, blood vessels constricted an average of two to four percent. These findings suggests a possible reason for why the rates of heart attacks increase with exposure to air pollution. Although, the degree of constriction itself is unlikely to produce significant problems in healthy individuals, such constriction could conceivably trigger cardiac events in people who are at risk of heart disease. "Our results are a clean demonstration that environmentally relevant concentrations of common air pollutants that can occur in urban settings adversely affect the blood vessels of healthy people," said Brook.
http://circ.ahajournals.org/cgi/content/abstract/105/13/1534

Estimated Public Health Impacts of Criteria Pollutant Air Emissions from the Salem Harbor and Brayton Point Power Plants
Harvard School of Public Health
May 4, 2000

Summary: Using a sophisticated model of how particulate matter and is dispersed in the atmosphere, Harvard School of Public Health scientists Jonathan Levy and John D. Spengler calculated exposures to 32 million residents living in New England, eastern New York and New Jersey from two older power plants currently exempt from more stringent pollution controls. Their report estimated that current emissions from the two power plants could be linked to more than 43,000 asthma attacks and nearly 300,000 incidents of upper respiratory symptoms per year in the region. The study also estimated that over 100 premature deaths per year could be attributed to this pollution. The study found that the health risks are greatest for people living closer to the plants: the risk of death to people living within 30 miles of the plants was found to be 3-4 times that of people living farther away. The researchers also analyzed the potential health benefits of reducing current emissions to the lower levels that would be reached by using the best available control technology required for newer power plants since the 1977 Clean Air Act and required by the US Environmental Protection Agency as retrofit on some older plants. Over 80 estimated premature deaths would be averted per year, along with 30,000 fewer asthma attacks and 200,000 fewer incidents of upper respiratory problems.
www.cleartheair.org/reports/ma_report.pdf

Estimated Public Health Impacts of Criteria Pollutant Air Emissions from Nine Fossil Fueled Power Plants in Illinois
Harvard School of Public Health
December 2000
As summarized in Risk in Perspective, April 2001.

Summary: The Harvard School of Public Health's Illinois study used the same sophisticated model as the Massachusetts study to show how particulate matter is dispersed in the atmosphere and the health effects on the 33 million residents living in the study area. The study, authored by Jonathan Levy and John D. Spengler, estimates that 400 premature deaths a year are attributable to particulate matter pollution from the nine power plants. Additionally, the report found that by requiring the nine power plants to meet modern emission standards, known as BACT, 300 premature deaths a year could be avoided, while incidents of daily upper respiratory symptoms would decrease by 400,000. The report also found that cardiovascular and respiratory emergency room visits and asthma attacks would be reduced by 2,000 and 10,000 incidences respectively. www.cleartheair.org/reports/il_report.pdf

Toxicological Effects of Mercury
National Academy of Sciences
July 11, 2000

Summary: In response to a directive from Congress, the Environmental Protection Agency commissioned a study on mercury pollution and its effects on humans. The prestigious National Academy of Sciences was hired to conduct the study, and after 18 months, the Academy's panel of experts returned with a report that essentially ends the rancorous debate waged over the last few years on whether or not to regulate mercury pollution. The report concluded that the current fish consumption advisories that 40 states currently employ to protect their citizens from mercury pollution, are inadequate at best, and that the goal should instead be to reduce the concentrations of mercury. The Academy's scientists estimated that 60,000 children are born each year that are exposed to mercury levels in pregnancy that could lead to neurological and learning problems. Coal fired power plants are the only major source of mercury that is still completely unregulated. http://www4.nationalacademies.org/news.nsf/isbn/0309071402?OpenDocument

Second National Report on Human Exposure to Environmental Chemicals
Centers for Disease Control and Prevention
January 2003

Summary: In its second assessment of mercury levels in the human body, the CDC found that 1 in 12 women of childbearing age has mercury levels above EPA's safe health threshold. Nationally, this translates into nearly 4.9 million women of childbearing age with elevated levels of mercury from eating contaminated fish. This results in approx. 322,000 newborns starting life each year with increased risk of neurological impairment form exposure in utero. Mercury is released into the atmosphere from power plants, waste incinerators and industrial processes. Humans are exposed to mercury when they consume mercury-laden fish.
www.cdc.gov/exposurereport

Perhaps the most compelling report related to the health impacts of fossil-fuel power plants is the recent report entitled: *Dirty Air, Dirty Power: Mortality and Health Damage Due to Air Pollution from Power Plants*, (Clear the Air / Clean Air Task Force, June 2004.) For this report, Clean Air Task Force commissioned Abt Associates, the consulting firm relied upon by U.S. EPA to assess the health benefits of many of the agency's air regulatory programs, to quantify the benefits of each of the respective clean up scenarios. The objective of the study was to quantify the expected health benefits (avoidable premature deaths, hospitalizations, etc.) of each of the scenarios. The health endpoints analyzed included death, lung cancer deaths, hospitalizations, emergency room visits, asthma attacks, and a variety of lesser symptoms.

To analyze the avoidable health impacts of fine particles based on the alternative policy scenarios, the Clean Air Task Force asked Abt Associates to run the various scenarios using methods developed for and employed by the U.S. EPA, extensively reviewed by EPA's Science Advisory Board, recently approved in a review by the National Academy of Sciences, and accepted by the U.S. Office of Management and Budget in a variety of regulatory impact and assessment contexts.

The report analyzed and quantified the health impacts of power plant pollution on specific states and certain metropolitan areas, and also quantified the health impacts of pollution from individual power plants. The report concluded that pollution from fossil-fuel power plants has the following health impacts on Massachusetts, specifically:

Health Statistics	
Deaths	340 per year
Heart Attacks	710 per year
Lung Cancer Deaths	40 per year
Asthma Attacks	8,069 per year
Hospital Admissions	342 per year
Chronic Bronchitis	241 per year
Asthma ER Visits	223 per year

The report also quantified the deaths from individual power plants. The health impacts from the five most polluting facilities in Massachusetts are detailed in the chart below:

Facility Name	Owner	Initial Year	Primary Fuel	SO2 Emissions (2002)	NOx Emissions (2002)	CO2 Emissions (2002)	Mercury Emissions (2002)	Attributable Deaths
Canal	Mirant	1968	Oil	22,014 tons	5,599 tons	4.1 million tons	Null	**39**
Brayton Point	Dominion	1963	Coal	39,593 tons	12,670 tons	7.4 million tons	196 lbs.	**141**
Salem Harbor	Dominion	1951	Coal / Oil	14,132 tons	3,794 tons	2.6 million tons	82 lbs.	**31**
Mt. Tom	Northeast Utilities	1960	Coal	5,282 tons	1,991 tons	1.1 million tons	32 lbs.	**9**
Somerset	Xcel Energy	N/A	Coal	4,399 tons	1,445 tons	908,000 tons	14 lbs.	**37**

B. Environmental Justice Implications of Power Plant Pollution

In conjunction with the above-mentioned research that quantifies the health impacts of power plant pollution, subsequent research has shown that African Americans are most at-risk from the power plant pollution. An October 2002 entitled *Air of Injustice: African Americans and Power Plant Pollution* found the following:

- In 2002, 71% of African Americans live in counties that violate federal air pollution standards, compared to 58% of the white population.
- 78% of African Americans live within 30 miles of a power plant, compared to 56% of the white population.
- The death rate from asthma for African Americans is twice that of whites (38.7 deaths per million population vs. 14.2 deaths per million population.) Studies in the U.S. have shown that emergency room visits increase when particulate matter and/or ozone levels are just slightly above national standards. (Note: the entire state of Massachusetts is currently in "non-attainment" of the most recent 8-hour ozone standard set by the U.S. EPA.)

The full report is available at: http://cta.policy.net/proactive/newsroom/release.vtml?id=23900

In July 2004, The League of United Latin American Citizens (LULAC), in conjunction with Clear the Air, issued a reported entitled *Air of Injustice: How Air Pollution Affects the Health of Hispanics and Latinos.* This report contained conclusions very similar to the above-mentioned 2002 report, and can be found online at: http://cta.policy.net/reports/air_of_injustice/air-of-injustice_english.pdf

The DEIS – in Section 5.15.2 – highlighted the La Capra Associates analysis that estimated a emissions reduction of 1,180 tons of nitrogen oxides (NOx); 4,000 tons of sulfur dioxide (SO2); and 949,000 tons of carbon dioxide (CO2). However, the La Capra analysis did not estimate the expected reductions in particulate matter (PM 2.5) and mercury – two of the more dangerous pollutants emitted from the region's fossil-fuel power plants. The DEIS should be expanded by including this analysis. The DEIS also estimated the potential health benefits from these offset emissions and concluded that calculations indicate that 12 premature deaths, 20 cases of bronchitis, 200 emergency room visits and 5,000 asthma attacks could be avoided once the Cape Wind project is in operation. These figures should – by themselves – be a compelling enough reason to approve the Cape Wind project to go forward. However, we would like to see a more thorough analysis conducted which calculates not the just the health benefits from offset emissions from current sources, but also looking at the impact Cape Wind will have on eliminating the need for new (potentially fossil fuel) sources from being constructed in the future.

III. Potential Impacts of Climate Change on the Region

Although the DEIS pays significant attention to the likely health benefits of Cape Wind as a result of offset emissions of soot and smog forming pollution from fossil-fuel power plants, not enough attention is paid to the impacts of climate change on the region. Cape Wind would represent one of the most significant steps forward towards reducing the region's reliance upon old, dirty sources of energy that emit high levels of carbon dioxide into the atmosphere.

Carbon dioxide is one of the most prominent greenhouse gases (GHGs) contributing to the problem of global climate change. According to the Massachusetts Department of Environmental Protection, the six most polluting power plants in Massachusetts emitted over 19,000,000 tons of CO2 into the atmosphere in 2003. As the DEIS points out, the Cape Wind project could result in over 900,000 tons of this pollution being kept out of the atmosphere annually.

The Army Corps of Engineers should look more closely at the potential impacts of climate change on the region. Although Cape Wind will not be able to single-handedly reverse global warming, the Cape Wind project would represent a significant step in the right direction in reducing greenhouse gas pollution from the energy sector. We urge the Army Corps of Engineers to include detailed information on the potential impacts of climate change on the region in the DEIS and to acknowledge that Cape Wind is part of a broader solution to that problem.

Some important points to consider when analyzing the impacts of global climate change on the region include:

- The United States contributes over 20% of total global greenhouse gases, with less than 5% of the world's population.[1]

[1] Intergovernmental Panel on Climate Change, 2000.

- The six dirtiest power plants in Massachusetts emitted over 19 million tons of carbon pollution in 2003.[2]

- Although estimates vary, sea level is projected to rise between 6 to 38 inches by 2100. In Massachusetts, an average of 65 acres of upland are submerged each year by a combination of rising seas and subsiding land.[3]

- By 2100, statewide temperatures could increase by about 4 degrees Fahrenheit in winter and spring and 5 degrees Fahrenheit in summer and fall.[4] This would give Boston a climate similar to Richmond, Virginia, which would have a drastic effect on the state's ecosystem and economy.[5]

- Precipitation in Massachusetts is expected to increase by about 10% in spring and summer, 15% in fall, and 20-60% in the winter by 2100.[6]

- Climate change could increase levels of ground-level ozone, which is shown to aggravate respiratory illness such as asthma, reduce existing lung function, and induce respiratory inflammation. Rising temperatures could increase heat-related deaths in Massachusetts by as much as 50 percent.[7]

- Global insurance giant *Swiss Re* recently warned that the economic costs of climate change could double in the next 10 years to $150 billion, hitting insurers with $30-$40 billion in claims.[8]

- According to a recent Pentagon report on its potential future global implications, climate change "should be elevated beyond a scientific debate to a US national security concern." The report warned of global wars over scarce resources and that "disruption and conflict will be endemic features of life."[9]

- It has been estimated that over 35% of worldwide plant and animal species could become extinct as a result of climate change.[10]

The Army Corps of Engineers should look at 2 key studies to gather more information on the potential impacts of climate change on the region:

- *Death By Degrees: The Health Threats of Climate Change in Massachusetts*, Physicians for Social Responsibility, February 2001.
- New England Regional Assessment Group. 2001. *Preparing for a Changing Climate: The Potential Consequences of Climate Variability and Change. New England Regional Overview,* U.S. Global Change Research Program, 96 pp., University of New Hampshire.

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[2] Massachusetts Department of Environmental Protection.
[3] U.S. Environmental Protection Agency. *Climate Change and Massachusetts.* September 1997.
[4] Ibid.
[5] New England Regional Assessment Group. 2001. *Preparing for a Changing Climate: The Potential Consequences of Climate Variability and Change. New England Regional Overview,* U.S. Global Change Research Program, p. iii.
[6] U.S. Environmental Protection Agency. *Climate Change and Massachusetts.* September 1997.
[7] Physicians for Social Responsibility. *Death By Degrees: The Health Threats of Climate Change in Massachusetts.* February 2001. p. 4.
[8] *"Opportunities and Risks of Climate Change,"* Swiss Reinsurance Company, Zurich. 2002.
[9] Climate Collapse: The Pentagon's Weather Nightmare, by David Sharp. *Fortune.* January 26, 2004.
[10] Thomas, C. D. *et al.* Extinction risk from climate change. *Nature* 427, 145-148 (2004) 4pp.

IV. Conclusion

Clean Water Action and the Regional Environmental Council feel that the Cape Wind project should be permitted to go forward based upon the net positive public health, economic and environmental impacts it will have on the region. Although we acknowledge that there is no such thing as a completely environmentally benign large-scale method for producing electricity, Cape Wind represents the type of projects that should be looked at to move our region towards an energy future that utilizes clean renewable alternatives to fossil fuels. Furthermore, we feel that more attention should be paid to the net environmental benefits of the project than currently exists in the DEIS. We look forward to reading the final Environmental Impact Statement.

Submitted by Jed Thorp, Energy Campaign Organizer
Clean Water Action, 36 Bromfield St., #204, Boston, MA 02108
February 24, 2005

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41 Winchester Street
Boston, MA 02116-5305

February 23, 2005

0044168

Ms. Karen Kirk-Adams
Manager, Cape Wind Energy Project EIS
U.S. Army Corps of Engineers
New England District
Regulatory Division
696 Virginia Road
Concord, Massachusetts 01742

Transmitted via e-mail: wind.energy@usace.army.mil

RE: Comment on DEIS for Cape Wind Project; Section 3.2.2.5 Wave Power Generation

Dear Ms. Kirk-Adams:

First of all, I would like to express my appreciation for the opportunity to submit a written statement to the Army Corps of Engineers (ACOE). This letter will articulate my concern for the Cape Wind Associates, LLC (Cape Wind) Draft Environmental Impact Study (DEIS) for the proposed wind-farm power plant, specifically addressing one issue: Wave Power Generation.

In the DEIS Section 3.0 Alternative Analysis, wave-power is addressed in Section 3.2.2.5. Simply put, the discussion and statements made within this DEIS Section, are not only inaccurate, but misleading. Superior information and analyses has since been made available, and should be included in the DEIS.

EPRI Report on Wave Power Generation

I enclose for the ACOE consideration – and incorporation into the DEIS –an EPRI (formerly known as the Electric Power Research Institute) report that fully addresses wave-power generation. As you may know, EPRI is arguably the nation's leading authority on technology and products for the electricity industry. EPRI is independent and unbiased; it serves over 1000 energy and utility companies worldwide with cutting edge technology solutions.

The enclosed EPRI report has up-to-date analyses on the state of technological advancements made in the wave-power industry. The report exhibits a leading wave-power generation product that is currently operating off the coast of England as a demonstration.

The EPRI report proposes that wave-power generation can and should be considered for commercial operation. Furthermore, it identifies several sites off the U.S. coast as adequate and competent for such projects. One of the proposed EPRI sites is located about 9 km off the East/Atlantic Ocean coast of Wellfleet, Massachusetts. The report concludes that a wave-power generation project off the coast of Cape Cod is economic and therefore more attractive than offshore wind energy generation. As a general comment, while the DEIS is an impressive document, the Alternative Analysis lacks fundamental economics from which comparisons of Alternatives can be made. The DEIS Alternative Analyses are "qualitative" and should have "hard" numbers as found in the EPRI Report.

Obviously the findings and recommendations of the EPRI report are in stark disagreement with statements found in DEIS Section 3.2.2.5. This Section identifies wave power generation technology as infeasible and specifically states it is not appropriate for waters around Massachusetts.

State of Technology/Products

The DEIS indicates that wave-power generation is early-stage and not ready for commercial use. Obviously the consultant writing this section of the DEIS was lacking current information. EPRI states otherwise and provides clear evidence and experience to prove that wave-power technology is proficient for commercial purposes.

In fact, the state of the wave-power technology appears to be comparable to the state of the GE 3.6 MW wind generator. While Cape Wind would depict the GE 3.6 MW unit as "commercial," the vendor, GE, does not make such a representation. GE is clear in its public promotion that the 3.6 MW design is in "demonstration" off the coast of Ireland where seven (7) prototypes are currently in operation. In fact, we have learned that the 3.6 MW products are currently being reconstructed and redesigned (specifically the height of the unit), which further affirms the product as anything but "commercial."

The state of the wave power product is thus similar or advanced to that of the GE wind turbine.

"Scaling" Wave Power Projects

In DEIS Section 3.2.2.5 the statement that wave power generation is not "scalable" is gratuitous and, with all due respect, such a statement borders on insulting the reader's intelligence. Wave power units can be "scaled" in the same way wind generators are scaled. The Cape Wind project is an example of "scaling" where many units are "bundled" together. It is simply not credible to say wave power generation cannot be "scaled."

As discussed in the EPRI report, the technology can be scaled. The project proposed for Wellfleet is about one third the size of the Cape Wind power plant. But with the vast area in the Atlantic Ocean off Wellfleet the EPRI-recommended commercial project could be scaled to that of Cape Wind's project and beyond.

Wave power generation is and can be more attractive than wind generation. Primarily, converting wave energy to electricity is considered to be one of the most environmentally beneficial ways of electricity generation.

Another obvious advantage is that the movement of waves is more predictable and reliable than the wind speed. While wind generation is contingent on the very diffuse wind energy source, wave energy naturally processes both wind energy and solar energy, making it more feasible and inexpensive to harvest.

Lastly, the issue of visual impact is eliminated. The proposed commercial devices can be sited in deeper water (50 m to 60 m) and farther from shore. Wave energy units are extremely inconspicuous. The low profile of the units will avoid radar signal reflections, which is a serious unresolved problem for the Cape Wind project given its close location to several airports. In addition, the devices are supported by a series of anchoring apparatus', which would make it virtually impossible for them to be ruined or harmed in any way by the shifting tides, and violent weather systems, however rough they may be.

Summary

The important issue for the ACOE is that this EPRI report and recommendation needs to be incorporated into the DEIS. EPRI is the most credible source of information; its recommendations are independent and non-biased with respect to alternative technology and/or sites for power production. A wave power project is clearly a viable alternative to the Cape Wind power plant, and deserves serious and objective consideration.

I support the Cape Cod Commission's recommendation that the ACOE produce a supplemental DEIS. This supplemental report will afford Cape Wind the opportunity to update its analysis on the competence of commercial wave power and an attractive alternative to the wind farm.

Thank you for your time and consideration.

Sincerely,

Glenn G. Wattley

Cc: Massachusetts Environmental Protection Agency
Cape Cod Commission

Enclosure: EPRI Report Sections Wave Power, Economics and Wellfleet Project

Electricity Innovation Institute

E2I EPRI Specification

Guidelines for Preliminary Estimation of Power Production by Offshore Wave Energy Conversion Devices

Report: E2I EPRI - WP - US - 001
Authors: George Hagerman and Roger Bedard
Date: December 22, 2003

Table of Contents

1. Background

Published data on Offshore Wave Energy Conversion (OWEC) devices seldom provide sufficient detail to assess the accuracy of power production claims. The offshore wind energy industry routinely publishes turbine performance data in the form of curves and/or tables depicting generated power as a function of wind speed (see General Electric 3.6 MW turbine at http://www.gepower.com/prod_serv/products/wind_turbines/en/index.htm, or Vestas 2.0 MW turbine at http://www.natwindpower.co.uk/northhoyle/gsv80.pdf for examples), yet wave energy developers rarely provide similar data on generated power as a function of seastate. One goal of the E2I/EPRI Offshore Wave Energy Feasibility Demonstration Project is to determine whether the offshore wave energy industry has reached a level of commercial maturity that can provide customer confidence in advertised claims of power production and the associated cost of energy.

This lack of documentation also makes it difficult to compare the likely performance of different OWEC devices in a given wave climate, particularly when different underlying assumptions and simulation or model test methods have been used to generate their power production estimates. Finally, without such documentation, it is impossible to establish a "baseline" performance against which industry improvements can be benchmarked.

In order to overcome these hurdles and enable the E2I/EPRI team to select the best OWEC device for each state and estimate the energy production of different devices at various sites with a known degree of confidence, this attachment provides:

- A common resource specification to be used by all developers responding to this Request for Information (RFI)
- A guideline that all developers should use in applying their performance data to this resource specification
- A request for specific documentation of developer-supplied performance data

These three items are covered as separate topics below. This specification then provides blank table templates for the performance data (capture width ratios) that we are requesting.

2. Wave Energy Resource Specification

(a) Rationale for Choosing Reference Measurement Stations

This specification is based on "reference stations" that the E2I/EPRI team believe best represent the long-term offshore wave climate in each of the six states participating in this study: Maine, Massachusetts, California, Oregon, Washington, and Hawaii. These are not necessarily the sites where a demonstration project or a commercial wave power plant would be built, but instead are sites that are sufficiently far offshore that they represent a state's most energetic wave climate along a broad section of coast. These stations also were chosen because they have long, relatively continuous wave measurement records (in some cases up to 20 years), comparable to the service life of a wave power plant.

During the Site Selection task of this study, the E2I/EPRI team will correlate the wave data at each reference station with other, shorter-term data available at other measurement stations and at numerical hindcast grid points across the continental shelf off each state. Two products from this task will be a preliminary wave energy resource map for each state and an environmental design data set for the most promising demonstration site in each state. The environmental design data set will include an annual and twelve monthly joint probability distribution tables of significant wave height and peak wave period at the selected demonstration site, characterization of the 100-year storm event that any project at that site must survive (in terms of wind, wave, and current conditions), and characterization of seafloor bathymetry and geological conditions for mooring system design.

The Site Selection task will consider not only the available wave energy resource, but also other key factors such as coastal load growth and the need for power, suitability of onshore grid connection points and transmission capacity, potential environmental conflicts and associated permitting requirements, and proximity to protected harbor areas with suitable fabrication yards and marine equipment for inspection, maintenance, and repair. This will be an iterative process involving our state partners and those wave energy developers that already may be pursuing a project at a particular site in a given state and are willing to collaborate with the E2I/EPRI team to leverage their efforts.

From the above description of the Site Selection task it is clear that it would be premature at this point to specify the wave energy resource at a particular demonstration site, since these sites have yet to be selected. Yet the E2I/EPRI team wants to provide developers at the outset with a reasonably accurate characterization of each state's offshore wave energy resources in terms of characteristic wave height and period distributions, so that developers can submit preliminary information for their devices based on this initial specification as input to our device screening process. The E2I/EPRI team also needs a common resource specification to which developers can apply their performance data, such that the likely energy production of different OWEC devices can be compared in different states. Below is a description of the six reference stations for this specification..

(b) Description of Reference Measurement Stations

The two largest inventories of long-term measured wave data in the United States are maintained by the National Data Buoy Center (NDBC) of the National Oceanic and Atmospheric Administration (http://www.ndbc.noaa.gov), and by the Coastal Data Information Program (CDIP) of Scripps Institution of Oceanography (http://cdip.ucsd.edu/). NDBC data buoys are equipped with strapped-down accelerometers for measuring wave conditions derived from buoy heave response. Wave spectra are computed from 20-minute time-series measurements of sea surface elevation changes, and these records are archived at one-hour intervals. CDIP offshore wave measurements are made almost exclusively made by Datawell Waverider® buoys, but offshore oil and gas production platforms also are used when available, to mount submerged pressure gages. Wave spectra are computed from 17-minute time-series measurements of sea surface elevation changes, and these records are archived at six-hour intervals.

The six reference stations used for this study are listed in Table 1 and mapped in Figures 1 through 3. Annual av[...]ations have been supplied electronically [...]an Excel workbook file named <EPRI Tp-b[...]

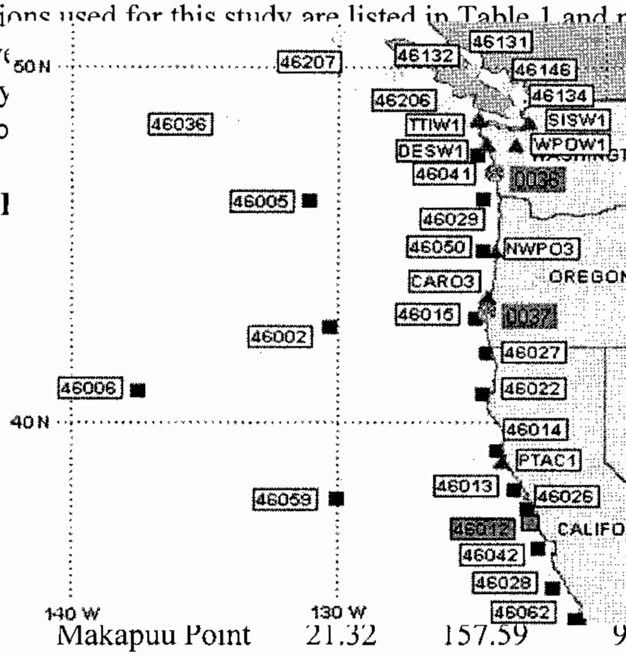


Table 1. E2I/E[...]ement Stations

State	Station Number				Depth (m)	Measurement Period (years)
ME	NDBC 44005				2	1983 – 2002
MA	NDBC 44008				3	1983 – 2002
CA	NDBC 46012				0	1983 – 2002
OR	CDIP 0037				4	1985 – 1996
WA	CDIP 0036				8	1987 – 2002
HI	CDIP 0098	Makapuu Point	21.32	157.59	91	1982 – 1996

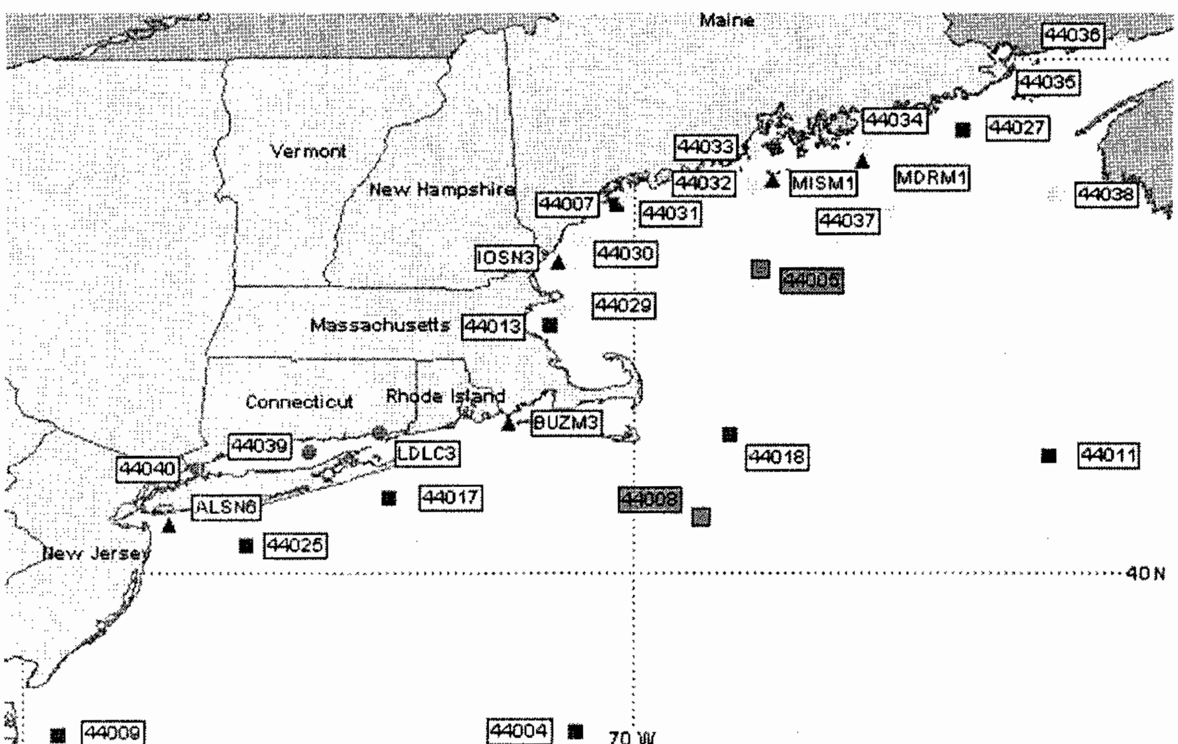
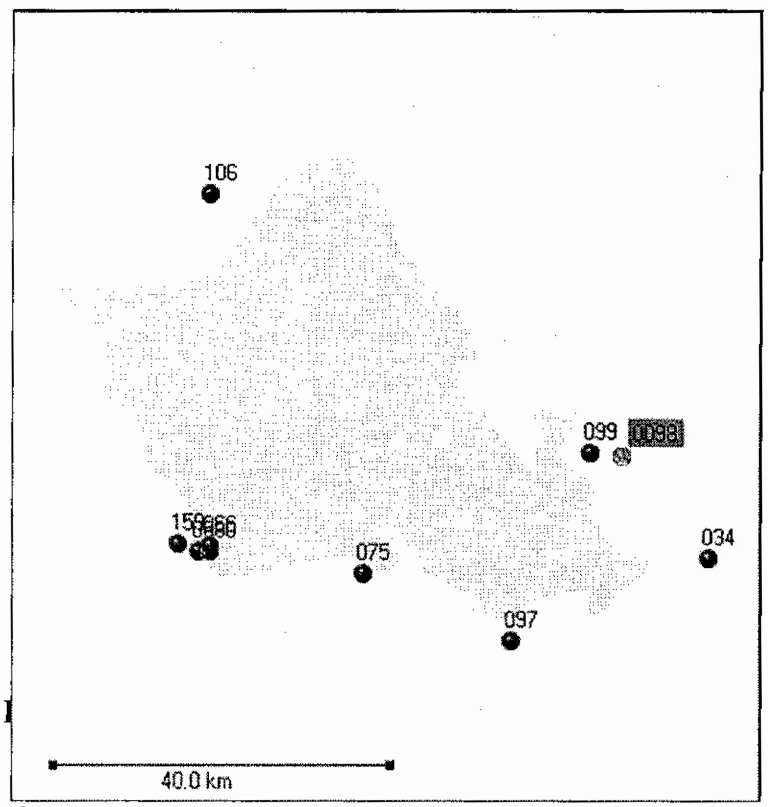


Figure 1. New England Wave Measurement Stations
(NDBC stations 44005 and 44008 symbolized by bright green squares)

Figure 2. West Coast Wave Measurement Stations
(NDBC station 46012 symbolized by bright green square;
CDIP stations 0036 and 0037 symbolized by bright green circles)



(c) Development of Wave Energy Scatter Diagrams

To develop the wave energy scatter diagrams for this initial resource specification, seastate parameter records were read to extract the significant wave height (**H_s** in m), and the peak wave period (**T_p** in sec), which is the inverse of the frequency at which the wave spectrum has its maximum value for the measured seastate record. Based on these two parameters, the incident wave power (**J** in kilowatts per meter of wave energy device width, or kW/m) associated with each seastate record was estimated by the following equation:

$$J = 0.42 \times (H_s)^2 \times T_p \qquad \textit{(Equation 1)}$$

The 0.42 multiplier in the above equation is exact for any seastate that is well represented by a two-parameter Bretschneider spectrum, but it could range from 0.3 to 0.5, depending on the relative amounts of energy in sea and swell components and the exact shape of the wave spectrum. Although such an estimate, based solely on the parameters **H_s** and **T_p**, is not exact, it was deemed adequate for this initial specification.

For the environmental design data set that will be developed for each state's selected demonstration site, a more accurate estimate is needed, and for this purpose the E2I/EPRI team will use the original archived spectra to exactly calculate incident wave power from spectral moments (as outlined in Reference 1).

Once the seastate parameters were read, and *Equation 1* used to estimate the incident wave power for a given measurement record, the record was sorted into the appropriate seastate bin according to the values of **H_s** and **T_p** for that record. Once all records were thus sorted, the number of records in each bin was divided by the total number of records in the entire measurement period. This yielded the percentage of time that a given seastate bin occurs, and when multiplied by 8766 hours in an average year (accounting for 29 days in February every fourth year), this gives the number of hours that each seastate occurs.

Multiplying the number of hours that each seastate occurs by the incident wave power density (in kW/m) for that bin yields the wave energy contribution (in kWh/m) of that bin. Summing the wave energy contribution across all bins and dividing by the number of hours in a year yields the annual average incident wave power at the reference location.

The accompanying Excel file contains just the wave energy scatter diagrams for each reference station. Any developer wanting to see the intermediate calculation sheets for a particular station should contact the E2I/EPRI Project Manager, Roger Bedard, who can provide the full workbook, which contains the raw scatter diagram, the joint probability distribution table, the number of hours that each seastate occurs during an average year, the wave energy scatter diagram, and the estimated incident wave power in each seastate, as calculated by *Equation 1*, assuming a Bretschneider two-parameter wave spectrum.

3. Power Production Estimating Guideline

A rectangular section from the wave energy scatter diagram for the Makapuu Point reference station in Hawaii is shown below. Note that seastates in the bin of **H_s** = 2 m and **T_p** = 9 sec contribute an average of 8,313 kWh of incident wave energy per meter's width of any OWEC device installed at that location.

Hawaii Annual Wave Energy Scatter Diagram (kWh per meter per year)									
Hs	Tp (sec)								
(m)	6	7	8	9	10	11	12	13	14
3	17	533	1,522	3,389	1,696	1,407	1,794	2,167	1,127
2.5	629	2,285	5,118	6,423	2,346	2,404	3,246	3,413	1,789
2	3,013	4,087	7,926	8,313	2,938	3,886	5,443	5,232	2,433
1.5	2,229	2,415	4,717	4,456	2,034	2,941	3,734	3,798	2,057

Even without obtaining the full workbook for this reference station, one can estimate the incident power in this seastate from *Equation 1* on the previous page as 15.12 kW/m, using the midpoints of the bin categories for $\mathbf{H_s}$ and $\mathbf{T_p}$. From this result it is a simple matter to back-calculate that this particular seastate bin occurs 550 hours per year, or about 6.3% of the time. Also note that 85% of the total annual offshore wave energy resource off Hawaii is contained within these 36 seastate bins. The Excel file accompanying this specification has highlighted for each state the rectangular sections that contain roughly 85% of the annual wave energy resource, and these are the basis for the table templates.

Thus our initial screening will be based on comparing device wave energy absorption within the "85% rectangular sections" given at the end of this specification, and interested wave energy developers should enter their performance data in the table template(s) for the state(s) of their choice. Each cell in a table should contain a developer's best estimates of the "capture width ratio" of the devices when operating in a random seaway having the same $\mathbf{H_s}$ and $\mathbf{T_p}$ as the midpoints of the seastate bin associated with that cell.

The capture width ratio of a device for a particular seastate should be calculated as the absorbed power (before losses in conversion to electric power) resulting from a particular seastate numerical simulation (or random wave model test) divided by the product of the incident wave power for that simulation (or test) and the width of the simulated device (or model). Thus if capture width ratio is symbolized as **CWR**, then the equation is:

$$\mathbf{CWR = P_{abs} / (J \times D_{\mathit{y}})} \qquad \textit{(Equation 2)}$$

where **CWR** is the capture width ratio (dimensionless – no units),
$\mathbf{P_{abs}}$ is the absorbed power in simulated or modelled seastate (e.g. in kW/),
J is the incident power in simulated or modelled seastate (e.g. in kW/m), and
$\mathbf{D_{\mathit{y}}}$ is the cross-wave dimension of the simulated device or test model (e.g. in m), which would be the diameter of a cylindrical buoy or beam of a rectangular raft.

For example, consider the numerical simulation results published by the wave energy research group at the Norwegian Institute of Technology (NTH), University of Trondheim for a slack-moored, heaving-cylinder device with phase control (Reference 2, which can be downloaded at http://www.phys.ntnu.no/instdef/prosjekter/bolgeenergi/simwec.pdf). The wave energy absorber is a cylindrical spar buoy, 3.3 m in diameter, having a molded depth of 5.1 m. A reaction plate, 8 m in diameter, is suspended from the buoy, in line with a double-acting hydraulic cylinder. The reaction plate is submerged 10 m below the sea surface, and relative motion between the buoy and plate strokes the cylinder, absorbing wave energy by converting work done on the buoy and plate by waves into fluid work.

This is a useful example because it illustrates how to handle the mismatch that occurs when device performance data are based on simulated or test seastates characterized by mean zero-crossing period (**T_z**) rather than the peak period characterization (**T_p**) that is used in this specification. It also illustrates how to extrapolate a limited set of simulation or test results to **H_s** - **T_p** seastate bins that have not been simulated or tested.

On page 17 of the above NTH paper, Table 9 lists the following results for numerical simulations of Pierson-Moskowitz (P-M) spectra, based on a 100-second steady-state simulation. The P-M spectrum is a special case of the Bretschneider spectrum, in which

$$T_p = T_z / 0.710 \qquad (Equation\ 3)$$

This equation should be used to convert **T_z** -based simulation or test results from P-M spectra to **T_p** for calculating the incident wave power during the simulations or test runs.

The P-M spectrum simulation results from Reference 2 are tabulated below. The top row indicates the mean-zero crossing period (**T_z**), and the second row indicates the associated peak period (**T_p**) calculated by *Equation 3*. The third row indicates the significant wave height (**H_s**), the fourth row indicates the absorbed power result (**P_{abs}**), and the fifth row indicates the incident wave power (**J**) calculated by *Equation 1*. Based on the buoy's diameter of 3.3 m, the last row of the table indicates the capture width ratio (**C**) in each seastate, as calculated by *Equation 2*.

NTH Simulation Results for Slack-Moored Heaving Buoy in P-M Spectra									
T_z (sec)	3.8	4.3	4.9	5.3	5.9	6.4	6.9	7.4	7.9
T_p (sec)	5.4	6.1	6.9	7.5	8.3	9.0	9.7	10.4	11.1
H_s (m)	0.9	1.3	1.6	2.0	2.4	2.9	3.4	4.0	4.6
P_{abs} (kW)	2.5	3.8	5.3	6.6	7.7	9.2	11.2	12.7	14.9
J (kW/m)	1.8	4.3	7.4	12.5	20.1	31.8	47.2	70.0	98.9
C	0.42	0.27	0.22	0.16	0.12	.088	.072	.055	.046

The next step is to map these capture width ratio results into the appropriate **H_s** - **T_p** bins of the "85% rectangular section" of the wave energy scatter diagram, which is done for the Hawaii station in the table below.

Capture Width Ratios for Hawaii Wave Energy Scatter Diagram									
Hs	**Tp (sec)**								
(m)	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
3	*.134*	*.108*	*.097*	.088	***.077***	***.070***	***.064***	***.059***	***.055***
2.5	*.161*	*.130*	.116	*.105*	***.093***	***.084***	***.077***	***.071***	***.065***
2	*.201*	.162	*.145*	*.131*	***.116***	***.105***	***.096***	***.088***	***.082***
1.5	.268	.216	*.193*	*.175*	***.154***	***.140***	***.128***	***.118***	***.109***

Note that only five of the NTH results (shaded in black and white print and yellow-shaded bins, red font in color print) map into the H_s - T_p distribution where 85% of the incident wave energy occurs in Hawaii. In a case such as this, the developer must either conduct new simulations targeted at the remaining 31 bins in the above table, which is the preferred approach, or the developer can fit a capture width ratio function to existing results that fall outside the "85% rectangular section," yielding **CWR** as a function of H_s and T_p and applying this function to the empty bins. For example, in Reference 2, P_{abs} is shown to be linearly proportional to H_s. Since **J** is proportional to $(H_s)^2$, it follows that **CWR** can be extrapolated according to the ratio $1/(H_s)$. This factor has been used to fill in the missing **CWR** values in the first four columns of the above table (*italicized blue font*). **CWR** as a 2nd-order polynomial function of T_p for a given H_s can then be fitted to the first four elements in each row, enabling extrapolation of **CWR** values into the last five columns (***bold italicized green font***). Multiplying the **CWR** in each bin by the incident wave energy (kWh/m/yr) in that same bin yields the annual amount of energy absorbed from seastates in that bin per meter of buoy diameter. Summing these products across all 36 bins shows that this device would absorb 12.3% of the wave energy in the entire section.

Energy production estimates derived from extrapolation clearly will be much more uncertain than targeted simulations or model tests. All other things being equal, the E2I/EPRI team will more favorably rank a developer that has a numerical simulation model that they can use to conduct simulations specifically targeted at the full range of H_s and T_p bins in the table templates of the appendices than a developer who can only extrapolate results from previous simulations or tests.

4. Requested Performance Documentation

For each state in which developers want their devices to be considered, they should enter their performance data into a table with the same number of columns and rows as the highlighted "85% rectangular section" in the wave energy scatter diagram for the state(s) of their choice. Each cell in this table should contain a developer's best estimates of the capture width ratio (**C**) of the devices when operating in a random seaway having the same H_s and T_p as the midpoints of the seastate bin associated with that cell. Guidance for how this should be done has been provided on pages 6 through 8 of this specification.

Developers also should document how they obtained the absorbed power results (P_{abs}) used to calculate capture width, as well as providing the cross-wave dimension (D_y) of their full-scale device. The documentation supplied depends on whether the absorbed power results are from numerical model simulations or physical wave tank testing of scale models.

(a) For numerical simulation results, the following information is required:

i. Time domain or frequency domain?

ii. Spectrum formula used (P-M, Bretschneider, JONSWAP, etc.)

iii. Duration of simulations (steady-state portion from which results derived) *iv.* At what model or prototype scale has numerical simulation been physically validated?

v. Validation results: How well does numerical simulation predict measured physical model or prototype output?

(b) For physical model test results, the following information is required:

i. Dimensions of model or prototype

ii. Dimensions (length, width, depth) of model test tank (or water depth and distance from shore for prototypes)

iii. Spectrum formula used (P-M, Bretschneider, JONSWAP, etc.)

iv. Duration of measurements (steady-state portion from which results derived)

5. References

(1) Therese Pontes: "Mathematical Description of Waves and Wave Energy." INETI Department of Renewable Energies. Lisbon, Portugal. December 2002.

(2) Håvard Eidsmoen: "Simulation of a Slack-Moored Heaving-Buoy Wave-Energy Converter with Phase Control." Division of Physics, Norwegian University of Science and Technology. Trondheim, Norway. May 1996.

6. Performance Data Templates for Scatter Diagram Rectangular Sections Contributing 85% of Total Annual Wave Energy

(a) ME Reference Station: NDBC 44005 – Gulf of Maine

Capture Width Ratios for Maine Wave Energy Scatter Diagram							
Hs (m)	Tp (sec)						
	6	7	8	9	10	11	12
5.5							
5							
4.5							
4							
3.5							
3							
2.5							
2							
1.5							
1							

(b) MA Reference Station: NDBC 44008 – Nantucket Shoals

Capture Width Ratios for Massachusetts Wave Energy Scatter Diagram							
Hs (m)	Tp (sec)						
	6	7	8	9	10	11	12
5.5							
5							
4.5							
4							
3.5							
3							
2.5							
2							
1.5							
1							

(c) CA Reference Station: NDBC 46012 – Half Moon Bay

Capture Width Ratios for California Wave Energy Scatter Diagram								
Hs (m)	Tp (sec)							
	7	8	9	10	11	12	14	17
4.5								
4								
3.5								
3								
2.5								
2								
1.5								
1								

(d) OR Reference Station: CDIP 0037 – Coquille River

Capture Width Ratios for Oregon Wave Energy Scatter Diagram									
Hs (m)	Tp (sec)								
	8	9	10	11	12	13	14	15	17
4.5									
4									
3.5									
3									
2.5									
2									
1.5									

(e) WA Reference Station: CDIP 0036 – Grays Harbor

Capture Width Ratios for Washington Wave Energy Scatter Diagram									
Hs (m)	Tp (sec)								
	8	9	10	11	12	13	14	15	17
5.5									
5									
4.5									
4									
3.5									
3									
2.5									
2									
1.5									

(f) HI Reference Station: CDIP 0098 – Makapuu Point

Capture Width Ratios for Hawaii Wave Energy Scatter Diagram									
Hs (m)	Tp (sec)								
	6	7	8	9	10	11	12	13	14
3									
2.5									
2									
1.5									

Appendix – Wave Energy Scatter Diagram Excel Workbook

<E2I EPRI Tp-based JPD Summary.xls>

1) Maine Reference Station .... NDBC 44005
2) Massachusetts Reference Station .... NDBC 44008
3) California Reference Station .... NDBC 46012
4) Oregon Reference Station .... CDIP 0037
5) Washington Reference Station .... CDIP 0036
6) Hawaii Reference Station.. CDIP 0098

Global Energy Partners, LLC
AN EPRI, DMJMH+N COMPANY

Electricity Innovation Institute

EPRI Global E2I Guideline

Economic Assessment Methodology for Offshore Wave Power Plants

Report: E2I EPRI WP - US – 002 Rev 4
Authors: Mirko Previsic, Omar Siddiqui and Roger Bedard
Date: November 30, 2004

Table of Contents

1. Introduction

The Electricity Innovation Institute (E2I) and the Electric Power Research Institute (EPRI) propose two standard cost estimate methodologies, a utility generator (UG) and a non utility generator (NUG) methodology, including a set of financial assumptions, to evaluate the economics of offshore wave power plants. The E2I EPRI Project Team will use these methodologies to evaluate the economics of both a 1,500 Mega Watt Hours Electric per Year (MWeh/yr) pilot plant and a 300,000 MWeh/yr commercial size plant (500 kW and 100 MW at 40 capacity factor respectively).

Regulated utilities are permitted to set electricity rates (i.e., collect revenue) that will cover operating costs and provide an opportunity to earn a reasonable rate of return on the property devoted to the business. This return must enable the UG to maintain its financial credit as well as to attract whatever capital may be required in the future for replacement, expansion and technological innovation and must be comparable to that earned by other businesses with corresponding risk.

Because the risks associated with private ownership are generally considered to be greater than utility ownership, the return on equity must be potentially higher in order to justify the investment. However, it is important to understand that there is no single right method to model an independently owned and operated NUG renewable power plant. Considerations such as an organization's access to capital, project risks, power purchase and contract terms determine project risks and therefore the cost of money.

This regulated UG methodology is based on a levelized cost approach using real (or constant) dollars with 2004 as the reference year and a 30 year book life. The purpose of this standard methodology is to provide a consistent, verifiable and replicable basis for computing the cost of electricity (COE) of an offshore wave energy generation project (i.e., a project to engineer, permit, procure, construct, operate and maintain an offshore wave energy power plant).

The NUG methodology is based on a cash flow analysis and projections of market electricity prices. This allows a NUG to estimate how quickly an initial investment is recovered and how returns change over time.

A cost estimate of the initial capital cost and the yearly operation and maintenance cost will be developed for both the pilot plant of immediate interest and an envisioned future commercial plant at the same site. A small-scale pilot plant with little cumulative production experience cannot be expected to be economically competitive with large-scale commercial technologies with high cumulative production experience. Therefore, decisions on the economic viability of offshore wave power technology must be made on the basis of large-scale commercial plant economics. The purpose of the notional 300,000 MWeh/yr plant cost of electricity evaluation is to assess the economic viability of a large-scale commercial application of the offshore wave technology and to allow a comparison against other large-scale commercial renewable generation options.

The results of this economic evaluation will help government policy makers determine the public benefit of investing public funds into building the experience base of wave energy to transform the market to the point where private investment will take over and sustain the market. Such technology support is typically done through funding R&D and through incentives for the deployment of targeted renewable technologies.

If the economics of the notional 300,000 MWeh/yr commercial off shore wave power plant is favorable with respect to alternative renewable generation options, a case can be made for pursuing the development of that offshore wave energy technology. If, however, even with the most optimistic assumptions, the economics of a commercial size offshore wave power plant is not favorable and cannot economically compete with the alternatives, a case can be made for not pursuing the offshore wave power technology development.

Relative to the pilot plant, the decision of whether to fund the Phase IB Implementation Planning task will be made in the fall of 2004 and the decision point of whether to fund the Phase II Detailed Design, Permitting and Construction Financing Task will be made in the winter of 2004. A key factor in those decisions is the cost to design, build and test the pilot plant. The initial capital cost required to build the pilot plant will be estimated as part of this Phase IA work this summer. Of particular importance is our emphasis on identifying unique opportunities that will enable a pilot plant to be built at an affordable cost.

2. Regulated Utility Generator (UG) Cost of Electricity Assessment Methodology and Assumptions

The proposed UG methodology is based on generally accepted regulated utility accounting practices. The cost of electricity (COE) is computed by levelizing a power plant's annual revenue requirements over the service life of the plant and dividing it by the plant's annual output. This makes it possible to compare alternative designs or technologies in terms of a single index – the levelized cost of electricity (COE). It is important to understand that in order to make such cost comparisons, the underlying assumptions must be the same for the different technologies being compared.

The methodology is implemented in an excel-spreadsheet solution which allows the analyst to input wave power plant component costs, power production, and financing assumptions in order to calculate the COE.

The following paragraphs provide a short outline of the steps and associated formulations used to calculate the COE:

- Determine Annual Revenue Requirements

  Annual revenue requirements are equal to the cost that the project incurs each year. We assume that the project will be financed with a debt/equity finance structure. Annual costs are determined by the following components: Debt Principal, Debt Interest, Return on Equity, State Taxes, Federal Taxes, State Tax Incentives, Federal Tax Incentives, Accelerated Depreciation, Property Taxes and Insurance. Over the life of the project, these revenue requirements change and need to be brought back to Net Present Value (NPV) in order to properly levelize the annual cost.

In a regulated UG framework, the annual cost to operate the power plant is defined as its "annual revenue requirement", i.e., the equivalent in revenue that would make the project break-even. In a regulated market, the UG can adjust its rates to provide cost recovery for its assets with a stipulated return.

- Levelizing Annual Revenue Requirements

Annual incurred costs are levelized by summating the NPVs for each year. The NPV is calculated using a discount rate that is determined by the cost of money. In this case, it is the capital finance structure (i.e. mix of equity and debt) that is used to calculate the pre-tax discount rate applicable to this project. Using this pre-tax discount rate and the applicable composite tax rate (i.e., a single value for the combined state and federal tax), the after tax discount rate can be determined and is used to calculate the NPV.

- Calculating the Fixed Charge Rate

The fixed charge rate is the percentage of the total plant cost that is required over the project life per year to cover the minimal annual revenue requirements. This fixed charge rate concept can be compared to a fixed rate home mortgage where a fixed annual payment will pay off the principal and interest over a period of time. It is calculated in three steps:

1) Calculate Capital Recovery Factor (CRF) as follows:

$$\text{CRF} = \left[\frac{\text{Discount Rate}}{(1 + \text{Discount Rate})^{\text{Book Life}} - 1} + \text{Discount Rate} \right] \qquad \text{(Equation 1)}$$

Please note from the formula above that the capital recovery factor is a direct function of the Discount Rate (yearly cost of money) and the Book Life (Project Duration in number of years).

2) Calculate the levelized annual charges by simply multiplying the capital recovery factor by the net present value.

3) Calculate the Levelized Annual Fixed Charge Rate by dividing the levelized annual charges by the Total Plant Investment (Booked Cost).

- Calculating the Cost of Electricity

The levelized cost of electricity is calculated by dividing the annual cost of the power plant by the Annual Energy Production. Because O&M and Levelized Overhaul and Replacement Costs were not previously considered, they are found in the formula below. The formula for computing the levelized cost of electricity (COE) is:

$$COE = \frac{(TPIxFCR) + (O\,\&\,M) + (LO\,\&\,R)}{AEP} \qquad \text{(Equation 2)}$$

where:

TPI	= Total Plant Investment
FCR	= Fixed Charge Rate (percent)
O&M	= Annual Operating and Maintenance Cost
LO&R	= Periodic Levelized Overhaul and Replacement Cost
AEP	= Annual Energy Production at Busbar

The annual energy production (AEP) calculation methodology is described in a separate E2I EPRI Offshore Wave Energy Project Standard [Reference 3]. Since long-term wave measurement data is averaged in order to come up with appropriate power generation values, the annual energy output is assumed to be constant over the life of the project..

The following sections discuss the core issues associated with this proposed methodology:

- Cost Components of a wave power plant (section 2.1)
- Taxation and Tax Incentives offered for renewable power plants (section 2.2)
- Cost Levelizing Procedures (section 2.3)
- Real and Nominal Energy Costs (section 2.4)
- Financing Assumptions (section 2.5)

2.1. Cost Components

The elements of the cost breakdown for a typical offshore wave power plant are described in this section. All capital expenditures are defined as installed cost and expressed in constant dollars with 2004 as the reference year. Being the installed cost, they include shipping and commissioning cost elements. The first level cost breakdown structure outlined below allows comparing different generation alternatives and identifying sensibilities of a particular wave power conversion design. This breakdown will also be useful for parametric optimization of a wave power plant s.

- *Absorber Structure:* All structural components that are directly responsible for the absorption of energy from ocean waves such as capture chamber, counter reacting mass absorber buoy, etc.

- *Power Take Off:* Turbo-machinery converts the slow oscillating movement of a prime-mover (mechanical motion of buoy, oscillating air-flow or water pressure in overtopping system) into electricity at grid frequency (50Hz or 60Hz) and transmission voltage.

- *Mooring:* All components required for holding the wave power conversion device in place.

- *Electrical Interconnection:* All cables required to interconnect the individual units to a common offshore interconnection point.

- *Grid Interconnection:* All cabling, switchgear, transmission lines and infrastructure required to connect the offshore wave farm to a nearby land-based grid interconnection point.

- *Substation to Substation Upgrade Cost:* The initial capital cost for any required distribution/transmission substation to substation cost will be included in the cost estimate, however, since that cost is credited back with interest within the first 5 years of operation to the Interconnection Customer (Wave Power Plant in this case), for simplicity reasons, that cost will not be factored into the cost of electricity or internal rate of return calculations

- *Communication, Command and Control:* All equipment and infrastructure required to establish a two way link from land-based to sea-based systems for purposes of communication, command and control.

- *Installation Cost* = the costs required to transport the system from its safe harbor assembly location to its deployment site and complete all interconnections and checkout to the point where the system is ready to begin official commissioning procedures.

- *Owner's Development Cost* = assume 5% of the costs through installation above

- *Spares Provisioning*: 2% of the hardware cost above

- *General Facilities and Engineering:* Engineering cost associated with the planning of a wave farm and general facilities required for deploying and operating the wave power plant. This could include necessary dock modifications, maintenance shops, etc. for the deployment and maintenance of the offshore wave farm as well as mobilization of the O%M itself..

- *Financial Fees:* 2% of the 1st year of debt with the cost occurring in the 2nd year of the two year construction period..

- *Commissioning:* The process, inspection and testing required to turn over the system from the general contactor to the owner/operator.

- *Total Plant Cost (TPC):* This is the total installed and commissioned cost of the power plant and consists of the abovementioned cost elements.

- *Interest during Construction:* Interest paid for the two-year construction loan (assumes two loans, one at the beginning of each year)

- *Total Plant Investment (TPI):* Total Plant Investment is the amount of capital required to build the power plant. TPI = TPC + Interest during Construction (called allowance for funds used during construction (AFUDC) in the regulated world).

- *Annual Scheduled O&M Cost:* The components of O&M costs are insurance, labor and parts. Labor includes equipment such as barges, dive boats, etc. to carry out O&M operations. Parts are simply replacement items. The O&M costs do NOT include the infrequently incurred costs of major overhauls of wave energy conversion devices or other components. These costs are included in the levelized replacement cost (LRC). Expenses are annual payments associated with plant operations and maintenance (O&M), and include recurring O&M and non-recurring O&M (which is estimated for the economic analysis based on related infrastructure projects from the offshore industry). The majority of the O&M costs associated with the wave energy conversion devices can be grouped into three categories:

    - Unscheduled maintenance to carry out repairs, typically occurring after a violent storm
    - Scheduled preventive maintenance for the wave energy conversion turbine and the power take off system
    - Scheduled major overhauls and subsystem replacements of the WEC device

- *Annual Unscheduled O&M Cost:* A provision for unscheduled maintenance is estimated at x% of the annual scheduled O&M cost.

- *Annual Insurance Cost:* 2% of TPC

- *Periodic Levelized Overhaul and Replacement Cost (LO&RC):* Depending on the specific manufacturer's design, major overhaul of the WEC device and mooring system is scheduled to occur every 5, 10 or 15 years. These major overhauls may address gears, bearings, seals and other moving parts as well as the mooring cable and components. Because these costs are incurred at intervals of several years and not routinely during each year, correct accounting for their costs requires an annual accrual of funds. The objective of this accrual is to have the funds available when the need for overhaul or replacement occurs. The accrual involves a net present value calculation to level or apportion the overhaul and replacement costs to an annualized basis consistent with the other cost elements. Because they are treated as investments, they are eligible for investment tax credits.

2.2. Income Taxation

For this project, we assume a federal rate of 35% and a state rate as shown in Table 1. The calculation of composite tax rate (i.e., federal and state) reflects the fact that state income taxes are deductible from federal taxes.

Table 1: State and Composite Income Tax Rates

State	State Tax Rate	Composite Rate Assuming 35% Federal Rate
CA	8.84 %	40.7 %
HI	6.02 %	38.9 %
MA	9.50 %	41.2 %
ME	8.93 %	40.8 %
OR	6.60 %	39.3 %
WA	0.00 %	35.0 %

Power plants that generate electricity from renewable energy resources qualify under IRS guidelines for an accelerated cost recovery period under the Modified Accelerated Cost Recovery (MACR) depreciation schedule as shown in Table 2[Reference 4].

Table 2: Applicable Accelerated Tax Depreciation Schedule

Year	Depreciation
1	20.00 %
2	32.00 %
3	19.20 %
4	11.52 %
5	11.52 %
6	5.76 %

The IRS explicitly mentions solar, wind, and geothermal as examples of qualifying renewable resources. Insofar as offshore wave energy is a derivative of solar and wind energy (i.e., the sun produces winds, and winds over the ocean produce waves) and its status as a renewable energy resource is self-evident, it is reasonable to assume that wave conversion plants would be eligible for the same depreciation treatment, as well as investment and production tax credits as described in the next section..

Tax-filing entities such as corporations are allowed to employ different tax depreciation assumptions for financial accounting (i.e. book) versus tax accounting purposes – so long as all assumptions conform to Generally Accepted Accounting Principles (GAAP). Accordingly, entities tend to apply more conservative depreciation assumptions (such as straight line depreciation) for financial accounting purposes to accentuate earnings, whereas they apply more accelerated depreciation assumptions for tax accounting to defray taxable income. This difference between the effective book and tax depreciation rates results in an annual variance between income taxes actually paid and those that would have been paid under book depreciation assumptions over the book life of the plant. The difference is referred to as deferred income tax. A utility is not allowed to earn a rate of return on deferred taxes. A renewable energy project will show negative taxes in the first couple of years of operation (mainly because of accelerated depreciation). If a renewable energy project were treated as individual entity, the negative values would need to be carried forward to future years (because there is no other tax obligations against which such deductions could be made in the present year). If a renewable energy project is a part of a utility's generation assets, it is likely that tax deductions will have a significant net impact on the bottom-line of a utility or IPP in the early years of operation. For the purpose of this project, such tax incentives are treated as direct benefits to the project in the year they occur.

2.3. Incentives

Federal and State government organizations are providing incentives for renewable energy projects in the form of tax credits and renewable portfolio standards and renewable energy certificates. The three main categories that have an impact on the economic feasibility on a renewable power plant are:

- Investment tax credits
- Production tax credits
- Renewable Portfolio Standards (RPS)/Renewable Energy Certificates (RECs)

These incentives will be analyzed for the commercial scale power plant economics analysis. The incentives occur in the early years of a wave power plant and have a positive impact on the NPV of a project.

The Federal Government provides a production tax credit (PTC) as an incentive for development of clean, renewable, domestic wind energy. Originally introduced through the Energy Policy Act of 1992, the PTC grants 1.5¢ per kilowatt-hour for the first ten years of operation to wind plants brought on line before June 30, 1999. The credit was then extended at 1.8¢ per kilowatt-hour for the first ten years of operation to wind plants brought on line before Dec 31, 2003. The PTC was again extended in late 2004 to Dec 31, 2005. We assume that the federal PTC for wind energy will be extended to ensure continued strong growth of America's renewable energy capabilities, and that wave energy will be eligible for the PTC

Investment and production tax credits for each of the states are shown in Table 3.

Table 3: Investment Production Tax Credits

	Investment Tax Credit		Production Tax Credit	
	State	**Federal**	**State**	**Federal**
CA	Credit of 6% of qualified costs paid or incurred for the acquisition or construction of qualified property (machinery, equipment, or capitalized labor) for manufacturing activities	10% of TPI		1.8¢ per kWh for the first 10 years
HI		10% of TPI		1.8¢ per kWh for the first 10 years
MA	Installation cost deductible if installed in Massachusetts	10% of TPI		1.8¢ per kWh for the first 10 years
ME		10% of TPI		1.8¢ per kWh for the first 10 years
OR	Business Energy Tax - Credit 25 % of project cost, up to $10M credit in 1st Year	10% of TPI		1.8¢ per kWh for the first 10 years
WA		10% of TPI		1.8¢ per kWh for the first 10 years

The New England Interconnection System Operator (NE-ISO) has created a market for renewable energy certificates. The value of RECs is currently about 2.5 cents/kWh.

2.4. Levelizing Costs

Levelized cost, which is intimately related to present value, is the uniform annual cost with the same present value as the actual annual cost.

Book depreciation and periodic investment in replacement equipment will cause a project's revenue requirements to change from year to year. The first step in calculating the levelized revenue requirement is to discount the time-varying cash flow for a particular reference year. The second step is to compute the equivalent payment (or annuity) that would have the same cumulative present value as the time-varying cash flow over the project's life.

Mathematical formulas for these two steps are described in any standard economics textbook.

The discount rate is the cost of money needed to finance an investment project. In this analysis, we use the after-tax cost of money. The discount rate that is applicable to this analysis is based on a corporation's access to the financial markets and will reflect a certain proportion of debt and equity financing for capital projects. This discount rate is dependent on whether ownership is a regulated utility or independent power producer.

2.5. Constant Dollar vs. Current Dollar Energy Costs

Energy costs can be computed in either constant dollars, which do not include the effects of inflation, or in current dollars, which do.

Please note that when comparing different investment alternatives, the most economical option will not change regardless of whether constant or current dollars are used. Even so, when presenting the results of such studies, the type of dollar used should be indicated, as should the reference year for input cost data, and in the case of a current dollar analysis, the assumed inflation rate.

When working with constant dollars, real interest rates are used, whereas when working with current dollars, nominal interest rates are used. As a simple example, if a homeowner's fixed rate mortgage is a nominal rate of 6% and inflation is 3%, the real rate, i.e., adjusted for inflation is 2.9% (real rate = ((1 + nominal rate)/(1 + inflation rate)) - 1).

2.6. Financing Assumptions

The four key assumptions that underpin the calculation of levelized cost are:

(1) The period over which the annual costs are incurred;
(2) The reference year dollar in which the annual costs are expressed;
(3) Whether the levelized costs are in constant or current terms;
(4) The discount rate, which is based on the capital structure (equity and/or debt) used to finance the project as well as the perceived risk of the project.

For this offshore wave energy project, we will use the following assumptions:

- 20 year plant life
- All costs in real or constant January 2004 dollars
- Commercial plant start date = January 2008 (plant design, permitting and financing in 2005, plant construction in 2006 and 2007)
- Inflation rate of 3.0%, based on the U.S. Producer Price Index for 2003 [1]

[1] Source: U.S. Bureau of Labor Statistics, 2004

Utility Assumptions

- Capital structure of 65% equity and 35% debt [2]
- Distribution of equity: 52% common equity and 13 % preferred equity[3]
- Cost of common equity of 13% (nominal) [2]
- Cost of debt before taxes of 7.5% (nominal) [2]
- Cost of preferred equity (nominal) of 10.5%, representing the average of the cost of common equity and cost of debt

Table 4: Example Regulated Utility Financing Assumption

	Percent	Nominal Rate	Real Rate(1)
Capital Structure (%)			
Common Equity	52	13.0 %	9.7 %
Preferred Equity	13	10.5 %	7.3 %
Long-Term Debt	35	7.5 %	4.4 %
Income Tax Rates			
Federal		35.0 %	35.0 %
State (generic @ 4.0%)		4.0 %	4.0 %
Composite (21)		37.6 %	37.6 %
Discount Rate (before tax)(3)		10.75 %	7.5 %
Discount Rate (after tax) (4)		9.72 %	6.5 %

(1) Real rate = (((1 + nominal rate)/(1 + inflation rate))-1)
(2) State income tax is deductible, so the composite rate is (0.35+0.040*(1-0.35))*100 = 37.6%
(2) The weighted cost of money or before-tax discount rate = Common equity share *interest rate + preferred equity share * interest rate + long-term debt share * interest rate
(3) The after-tax discount rate = Common equity share *interest rate + preferred equity share * interest rate + long-term debt share * interest rate * (1-composite tax rate)

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[2] www.eere.energy.gov/consumerinfo/pfds/financial.pdf

[3] Consistent with historical 4:1 ratio between common and preferred stock in the Composite Balance Sheet for Major U.S. Investor-Owned Electric Utilities, 1996 – 2000 compiled by the Energy Information Administration (http://www.eia.doe.gov/cneaf/electricity/invest/t8.txt).

3. Non Utility Generator (NUG) Cost of Electricity Assessment Methodology and Assumptions

The key differences between UG and NUGs are:

- Obligation to Serve – UG's have traditionally had an obligation to serve and to provide reliable electric service. NUG's develop a project for its potential economic rewards and have the option to sell their power on a wholesale basis to a utility, on a retail basis to the customer, or directly to a power pool.

- Rates/Prices – Rates for UGs are usually set using the revenue requirements approach. NUGs typically attempt to set the prices as high as the market will allow.

- Risks and benefits -- Customers of UGs bear the risks associated with prudent investments. Since customer, not utilities, bear the risk, UGs earn a lower rate of return on investments associated with a monopoly. NUGs bear the risks associated with their investments but can mitigate them to an extent that they negotiate contracts for energy sales.

NUGs can be classified into different types; however, for purpose of this analysis, we assume that the NUG is a Merchant Power Plant. Merchant plants are generally characterized as those that have substantial commodity risks for electricity sales (i.e., a substantial portion of their electricity sales is not fully committed to long term power sales agreements). The power will either be sold on a spot market basis to a power pool or under contracts with varying terms to utilities.

3.1. Development of an Economic Pro Forma for a NUG

While there are a variety of methods to evaluate NUG power projects, all methods depend on calculating cash flows. The cash flows represent all revenues from the sale of electricity less the sum of all expenses, debt service and income taxes. The net cash flow represents cash available to equity holders.

Cost Components, Income Taxation, and Investment/Production Tax Credits

The cost component, income taxation and investment/production tax credits are the same for UGs as described in section 2.1, 2.2 and 2.3 respectively

Constant Dollar vs. Current Dollar Energy Costs

Energy costs can be computed in either constant dollars, which do not include the effects of inflation, or in current dollars, which do. Please note that when comparing different investment alternatives, the most economical option will not change regardless of whether real or nominal dollars are used. Even so, when presenting the results of such studies, the type of dollar used should be indicated, as should the reference year for input cost data.

Financing Cost

- Capital structure of 30% equity and 70% debt [4]
- Cost of equity of 17.0% (nominal), a premium over the utility cost of equity due to higher inherent risk [4]
- Cost of debt of 8% (nominal) [4]
- Interest rate on construction loan assumed equivalent to cost of debt: 8% (interest)
- Financial fees of 2% of the loan amount and
- Debt service reserve of 6 months of debt service

Table 5: Example Independent Power Producer Financing Assumptions

	Percent	Rate Nominal	Rate Real
Scenario 2: Long-term (30 year) Capital Structure (%)			
Equity	30	17.0 %	13.60 %
Debt	70	8.0 %	4.9 %
Income Tax Rates			
Federal		35.0 %	35.0 %
State (generic @ 4.0%)		4.0 %	4.0 %
Composite		37.6 %	37.6 %
Discount Rate (before tax)		10.7 %	7.5 %
Discount Rate (after tax)		8.5 %	5.3 %

Development Cost

Development costs include a variety of costs that a NUG incurs to develop a project. Examples include security deposits, permitting (including constriction permits and environmental permits), owner's engineering and general and administrative costs, development fees, legal fees and easements and rights of way. These costs can vary widely depending on the specific project. For purposes of this analysis, we assume a cost allowance of 5% of the TPC.

[4] www.eere.energy.gov/consumerinfo/pfds/financial.pdf

3.2. Income Statement

The income statement summarizes the revenues and expenses for each year of the project. A layout of a typical income statement is shown in Table 6.

Table 6. NUG Income Statement

	Year - 2	....	Year N	Total
REVENUES				
Capacity Payments				
Energy Payments				
Federal Production Tax Credit				
TOTAL REVENUES				
Avg Electricity Revenues (cents/kWh)				
VARIABLE OPERATING EXPENSES				
Supplies and Consumables				
Unscheduled Operation and Maintenance				
TOTAL				
FIXED OPERATING EXPENSES				
Scheduled Operation and Maintenance				
Scheduled Overhaul/Replacement				
Insurance				
TOTAL				
TOTAL OPERATIG EXPENSES				
EARNINGS BEFORE INTEREST, DEPREC, TAXES, AND AMORTIZATION (EBIDTA)				
INCOME TAX				
Tax Depreciation				
EARNINGS BEFORE INCOME / TAXES				
Interest paid				
Total Interest Received (5% per year)				
NET OPERATING INCOME (LOSS)				
TAXABLE EARNINGS				
State Tax				
Federal Tax				
TOTAL TAX OBLIGATION				
NET EARNINGS AFTER TAXES				

3.3. Revenues

The forecast of revenues over the service life of a merchant power plant is one of the most critical aspects of the economic analysis. The analysis requires a forecast of market prices. In a deregulated market, prices need to be forecast by time-of-day and time of year and gets very complex very quickly. For simplicity of analysis and understanding, this methodology assumes only an energy component (the capacity component shown in Table 6 is zero) and an average power sales price as a function of state. Two electricity price indicators; industrial price and avoided cost, on a state-by-state basis, and one forecast model is used

Industrial Price.

The 2002 industrial and residential electricity prices by state from the DOE Energy Information Agency[5]), interpreted as wholesale and retail prices respectively, is as follows:

- CA – 10.8 and 12.9 cents/kWh in January 2002
- WA – 4.6 and 6.3 cents/kWh in January 2002
- OR – 4.7 and 7.1 cents/kWh in January 2002
- HI - 11 and 15.5 cents/kWh in January 2002
- MA – 8.8 and 11 cents/kWh in January 2002
- ME[6] – 6.5 and 10 cents/kWh in January 2002

Avoided Cost

Avoided cost is defined as the incremental cost to an electric utility of electric energy or capacity or both which, but for the purchase from a qualifying facility, the utility would generate itself or purchase from another source. Analyses may be conducted where the avoided cost is the selling price that a generator receives from a grid operator, retailer or marketing agency. The avoided cost by state is as follows

- CA – 5.4 cents/kWh in 2004$ for Northern California from E3 and the CA PUC[7]
- HI – 8.69 cents/kWh in 2004$ from personnel communication from Darren Ishimura of HECO[8]
- OR - 4.91 cents/kWh in 2004$ from Portland General filing with the PUC of Oregon
- MA & ME – 5 cents/kWh in 2004$ from the New England ISO website in October, 2004 for the day ahead market

[5] http://www.eia.doe.gov/cneaf/electricity/st_profile/maine.pdf or replace Maine with state of concern

[6] EIA 2002 industrial and residential electricity prices for Maine is 11.2 and 12 cents/kWh respectively. At the direction of the Maine Project Advisors, we are using 6.5 and 10 cents/kWh for wholesale and retail prices

[7] "Avoided Cost Estimation" www.ethre.com/avoidedcosys.html Energy and Environmental Economics for the California PUC

[8] Darren Ishimura Personnel communication, 4th Quarter 2004 for over 100 kW for Oahu Hawaii 9.64 cents/kWh (on-peak: 7 am to 9 pm) and 7.37 cents/kW/h (off-peak: 9 pm to 7 am). Weighted average = 8.69 cents/kWh

Electricity Price Forecast

The electricity price forecast from the EIA (Reference 11) is shown graphically in Figure 1 and is as follows *"Average U.S. electricity prices, in real 2002 dollars, are expected to decline by 8 percent, from 7.2 cents per kilowatthour in 2002 to 6.6 cents in 2008 (Figure 74), and to remain relatively stable until 2011. From 2011 they are projected to increase gradually, by 0.3 percent per year, to 6.9 cents per kilowatthour in 2025, generally following the trend of the generation component of electricity price, which currently makes up 64 percent of electricity prices."*

Figure 74. Average U.S. retail electricity prices, 1970-2025 (2002 cents per kilowatthour)

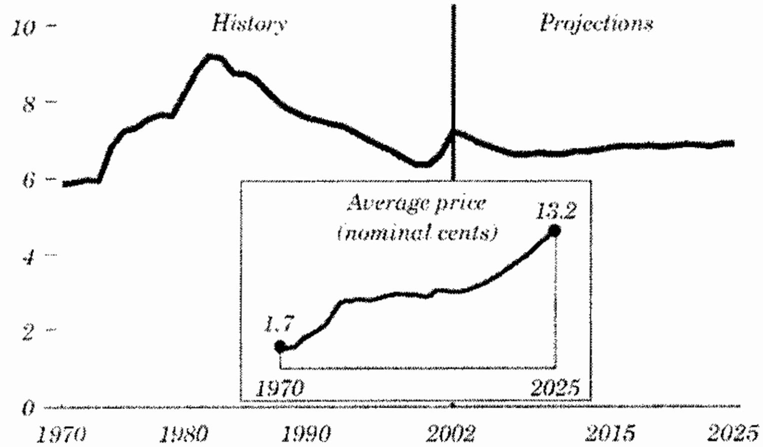

Figure 1. EIA retail electricity price from 1970 with projections to 2025

An alternative to using the industrial price as the basis for competitive price of electricity is to use marginal costs for that basis. Economic theory states that competition drives prices to marginal costs if there are many producers and many consumers. For electricity, this means that the competitive prices for generation services would be based on the cost of producing the last kWh of electricity (marginal costs is defined as the cost to the utility of providing the last (marginal) kilowatthour of electricity, irrespective of sunk costs). This method of pricing is different from the cost-of-service regulatory practice (explained in section 2 of this report), which uses average costs (total costs divided by total sales) as the basis for prices. The application of market costs as the basis of prices assumes that no producer or consumer exercises market power.

The avoided cost data for the Oahu Hawaii data (4th quarter of 2004) was provided by HECO. It is 9.64 cents/kWh on-peak (7 am to 9 pm) and 7.37 cents/kWh off-peak (9 pm to 7 am). This reduces to an average hourly avoided cost of 8.69 cents/kWh

3.4. Cash Flow Statement

A cash flow statement calculates the after tax net cash flow for the project. A layout of a typical cash flow statement is shown in Table 7. The cash flow statement begins with the EBITDA as brought forward from Table 6 and includes the following adjustments:

- Less income Taxes
- Less debt service (principal + interest for the loan)
- Plus interest received from the debt reserve fund
- Less any new contributions to reserve
- Plus return of the reserves at the end of the debt service term
- Less any adjustments to working capital
- Less equity investment during constriction

Table 7. NUG Cash Flow Statement

	Year - 2	....	Year N	Total
EBITDA				
Taxes Paid				
CASH FLOW FROM OPERATIONS				
Debt Service				
Interest Received				
Contribution to Reserves				
Disbursement of Reserves				
ADDITIONS TO WORKING CAPITAL				
Accounts Receivable				
Spare Parts				
CAPITALIZED REFURBISHMENTS				
CONTRIBUTED CAPITAL				
NET CASH FLOW BEFORE TAX				
CUM NET CASH FLOW BEFORE TAX				
NET CASH FLOW AFTER TAX				
CUM NET CASH FLOW AFTER TAX				
CUM IRR ON AFTER TAX NET CASH FLOW				

3.5. Economic Indicators

The net present value (NPV) and the internal rate of return (IRR) are economic measures of the project that reflect the present worth of profit over the service life and the profitability of the project, respectively.

Net Present Value

The net present value represents the present value (or present worth) of profit using the time value of money. This calculation results from discounting the net cash flows at the minimum acceptable rate of return for the equity investor. The method is also referred to as the discounted cash flow method.

The net present value must be defined at a certain point in time. Frequently, the NPV is calculated at the commercial operation date. In this case, the total capital requirement (at the commercial operation date) is subtracted from the net cash flows that are discounted or brought back to the same date.

Internal Rate of Return

The internal rate of return (IRR) addresses the profitability of a project. Mathematically, the IRRT is defined as the discount rate that sets the present worth of the net cash flows over the service life equal to the equity investment at the commercial operating date.

An IRR of 20% does not necessarily mean that the net cash flows will represent 20% of the equity investment for each and every year of the service life. However, an IRR of 20% does mean that the equity investor will earn an equivalent of 20% of the outstanding balance each yea, The balance will be reduced in some fashion over the life of the plant.

Many companies have a minimally acceptable IRR that must be met before a potential project is seriously considered. The minimum acceptable rate is known as the hurdle rate. It can be used to screen potential projects based on their IRR

There are several caveats to be aware of when calculating the IRR:

- The IRR solution is a trial and error solution that is typically solved by a convergence routine available in spreadsheet software
- The solution is based on solving an "n-th" degree polynomial that may have multiple real positive roots. More that one change in the sign of the coefficients of the net cash flows is an indication of multiple positive roots. A standard engineering economics should be consulted for situations where multiple roots are suspected.
- Changes in the IRR are not scalar and a small change in the cash flows can have a large effect on the IRR

- Comparisons of the IRR may be misleading. While the IRR allows investors to rank options based on their potential rate of return, it does not take into account a project's size. For example, it does not allow an analyst to capture a $1 million project with a 25% IRR and a $10 million alternative having a 20% IRR. An incremental analysis may be required. A standard engineering economics should be consulted for these situations.

Discounted Payback Period

The discounted payback period (DPP) represents the number of years for the present worth of net cash flows to recover the capital investment. Time value of money considerations are considered (as opposed to a simple payback period in which the time value of money is not considered).

4. General Considerations

4.1. Cost Accuracy

Since commercial-scale demonstration of an offshore wave power plant has not been accomplished to date, the economics associated with future wave power are uncertain. Furthermore, we do not know whether wave power will ever become cost competitive relative to other energy sources. However, we do believe that wave power is an energy resource that is too important to overlook and therefore needs to be developed to the point where the economics are well enough understood so there can be a determination of future cost competitiveness. In order to quantify the accuracy of the cost estimates to be made in this project, we use the accuracy versus cost estimate rating and stage of development relationship as shown in the following table:

Table 8: Accuracy Range for Cost Data

Cost Estimate Rating	A Mature	B Commercial	C Demonstration	D Pilot	E Conceptual (Idea or Lab)
A. Actual	0	-	-	-	-
B. Detailed	-5 to +5	-10 to +10	-15 to +20	-	-
C. Preliminary	-10 to +10	-15 to +15	-20 to +20	-25 to +30	-30 to +50
D. Simplified	-15 to +15	-20 to _20	-25 to +30	-30 to +30	-30 to +80
E. Goal	-	-30 to +70	-30 to +80	-30 to +100	-30 to +200

- A – Actual – Data on detailed process and mechanical designs with historical data from existing units
- B – Detailed – Detailed process and mechanical design and cost estimate but no historical data
- C – Preliminary – Preliminary process and mechanical design
- D- Simplified - Simplified process and mechanical design
- E – Goal – Technical design/cost goal or cost estimate developed from literature data

Using this table, the accuracy of the cost estimates for this project during the Phase 1A Project Definition Study are expected to be:

- Initial capital cost = -30 to +30% accurate based on the existence of prototypes and the simplified cost estimate level of detail for this project

- Replacement and overhaul capital cost and O&M = -30 to +80% accurate based on the lack of existence of any experience with periodic replacement and overhaul and O&M

The estimates will have a relatively high degree of uncertainty, particularly in the O&M and LO&RC area. E2I EPRI will evaluate the economic competitiveness at both the optimistic and pessimistic ends of the uncertainty spectrum.

4.2. Experience Curves

When comparing an emerging technology such as wave power to other generation options, it is important to understand that cost reduction of a commercial technology are achieved through experience as installed capacity or production volume grows. This relationship between cost and experience is represented by the experience curve illustrated in Figure 2 below where both axes are on a logarithmic scale.

4.2.1.The Experience Curve Equation

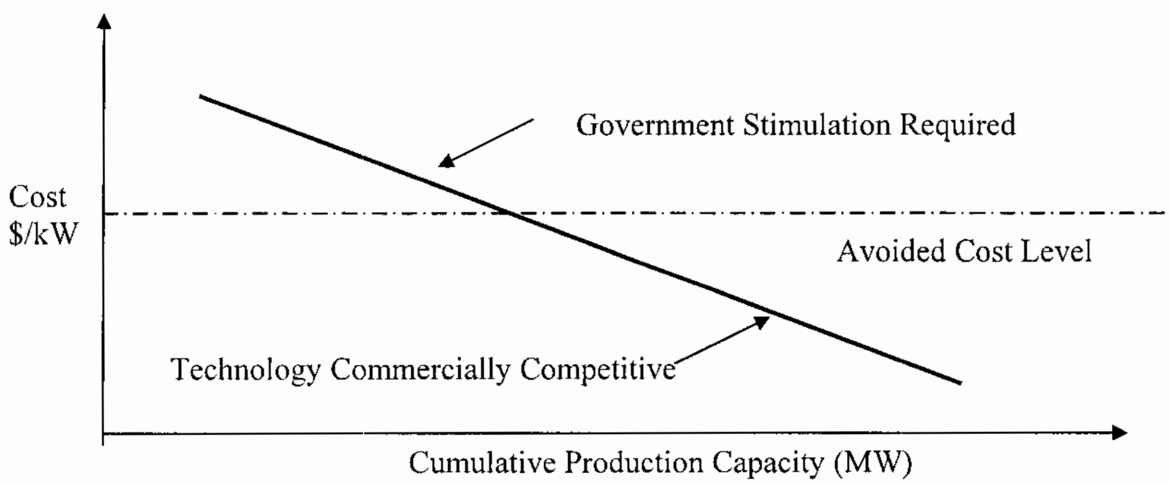

Figure 2 – A Typical Renewable Energy Technology Experience Curve

The above illustration shows the development of a typical power generation option. Initial capital costs are high and cost reductions start to occur as the technology matures and the installed capacity base grows. In order to bring any renewable resource into the market place, government stimulation is required in the early stage of production. Mechanisms to stimulate the adoption of technologies can be production credits, investment credits or a mandated purchase of a certain amount of energy from a specific resource option. As the installed capacity base grows, the cost of power generation comes down. Once it becomes commercially competitive (generation costs are falling below avoided cost levels), government incentives are no longer required and the market will adopt more capacity because the specific resource option is competitive without any subsidies.

The progress ratio and the learning rate are the same for any part of the simple experience curve in Figure 1. This means that young technologies learn faster from market experience than old technologies with the same progress ratios. Market expansion from 1 to 2 MW reduces prices by 18% in the example in Figure1, but, at a volume of 1000 MW, the market has to deploy another 1000 MW to obtain another 18% price reduction.

The curve in Figure 2 is commonly referred to as the "experience curve." The curve is described by:

Price at year t = Po * X-E (Equation 3)

where:

Po = a constant equal to the price at one unit of cumulative production
X = the cumulative production in year t
E = the positive experience factor which characterizes the inclination of the curve.

Large value if E indicate a steep curve with a high learning rate. The relation between the progress ratio PR and the experience factor is

$$PR = \{Po * (2X)^{-E}\} / (Po * X^{-E}\} = 2^{-E} \quad \text{(Equation 4)}$$

The experience parameter for the curve of Figure 1 is E = 0.29 which gives a Progress ratio $PR = 2^{-0.29} = 0.82 = 82\%$

The empirical and theoretical bases for expecting a reduction in unit cost with increased volume are well established. A recent paper [(Reference 6)] analyzed two business sectors closely related to offshore wave (and wind) farm costs, namely, oil and gas developments, and showed significant cost reductions were achieved with increasing experience with these technologies. The paper concludes that technological similarities with offshore wave energy renewable technologies indicate that it is reasonable to expect similar cost effects.

4.2.2. The PV Experience Curve

Figure 4 shows the experience curve for photovoltaic modules on the world Market [(Reference 5)] for the period 1976 to 2002. The data indicates a steady, progressive decrease in prices through cumulative sales that are used as the measure of the experience accumulated within the industry. The relationship remains the same over three orders of magnitude. The data are presented in a double logarithmic diagram. With this representation, it is possible to follow the experience effect over many orders of magnitude of production volume with a straight-line representation, making it easy to identify the experience effect.

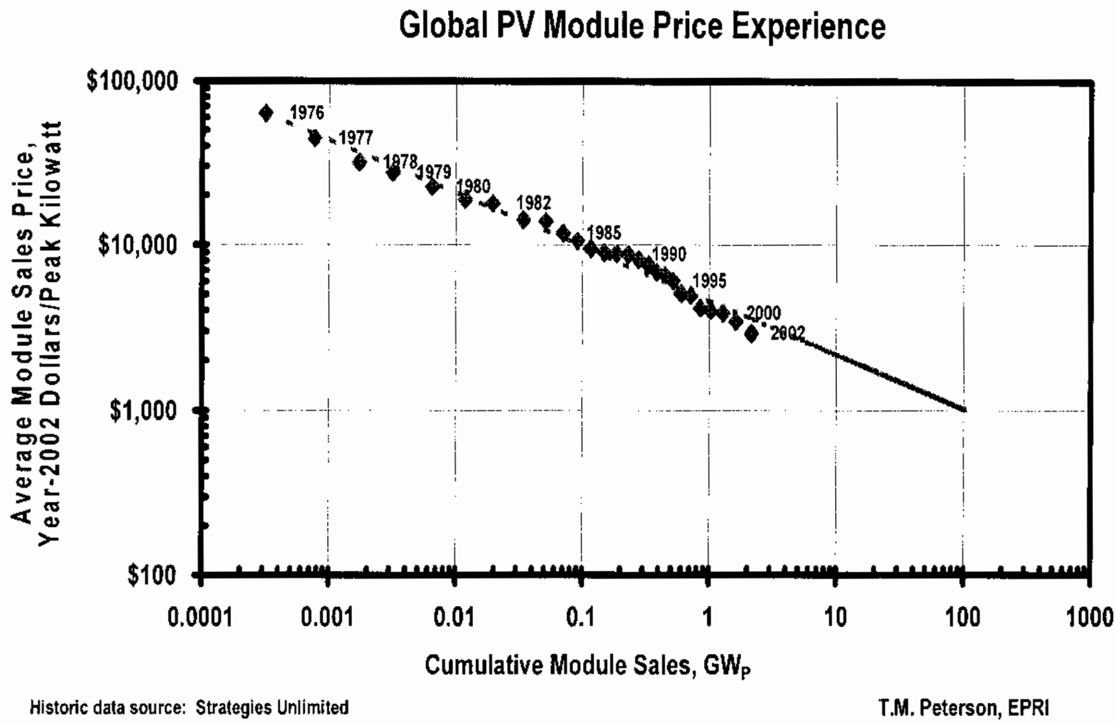

Figure 3. PV Experience Curve

The experience curve for PV shown in Figure 3 has a progress ration PR = 82% meaning that the price is reduced by 0.82 of its previous level after a doubling of cumulative sales.

4.2.3. The Wind Technology Experience Curve

Wind energy system costs have decreased significantly over the past couple of decades (Reference 7). The initial capital cost per kW in 1980 is quoted at about $2,800/kW and this decreased to about $1,000/kW in 1995.

Worldwide, installed wind capacity has grown an average of 25% per year since 1990 (Reference 5). By the end of 2000 it reached 17.0 GW. In the U.S., average wind energy cost of electricity (year 2000 dollars) fell from 47 cents/kWh in 1981 to 5.1 cents/kWh in 1995 as installed wind power capacity expanded to about 1.5 GWe. Historically, progress curve rates are about 80% in the U.S. for wind, PV, and gas turbine technology (Reference 6). In Europe, similar 80% progress rate curves have been seen. (Reference 7 Figure 3.3)

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Electricity Innovation Institute

System Level Design, Performance and Costs – Massachusetts State Offshore Wave Power Plant

Report:	E2I Global EPRI - WP – 006 – MA
Principal Investigator:	Mirko Previsic
Contributors:	Roger Bedard, George Hagerman and Omar Siddiqui
Date:	November 30, 2004

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Table of Contents

1. Introduction and Summary

This document describes the results of the system level design, performance and cost study for both a feasibility demonstration pilot plant and a commercial size offshore wave power plant installed off the coast of Massachusetts. For purposes of this point design study, the Ocean Power Delivery (OPD) Pelamis wave energy conversion (WEC) device and an area for deployment off the coast at Cape Cod was selected. The study was carried out using the methodology and standards established in the Design Methodology Report (Reference 1), the Power Production Performance Methodology Report (Reference 2) and the Cost Estimate and Economics Assessment Methodology Report (Reference 3).

A pilot scale wave power demonstration plant using a single Pelamis Wave Energy Conversion device was evaluated. The yearly electrical energy produced and delivered to the grid interconnection is estimated to be 964 MWh at the selected deployment site and would cost $5.5 million to build (build ($4.9 million after the Massachusetts installation tax deduction and Federal 10% tax credit). This cost only reflects the capital needed to purchase a single Pelamis unit, the construction costs to build it and the grid interconnection cost. Therefore, it represents the installed capital cost needed to evaluate and test a single Pelamis WEC system, but does not include the following elements:

- Detailed Design, Permitting and Construction Financing
- O&M Costs
- Test and Evaluation Cost

A commercial scale wave power plant was also evaluated to establish a base case from which cost comparisons to other renewable energy systems can be made. The yearly electrical energy produced and delivered to bus bar is estimated to be 1,453 MWh/year for each Pelamis WEC device. In order to meet the target output of 300,000 MWh/year a total of 206 Pelamis WEC devices are required. This is the equivalent output of a commercial 100MW wind farm with a 40% capacity factor. The elements of cost and economics (with cost in 2004$) are:

- Total Plant Investment = $273 million
- Annual O&M Cost = $12.4 million; 10-year Refit Cost = $26.5 million
- Levelized Cost of Electricity (COE)[1] = 13.4 cents/kWh (nominal rate) - 11.1 cents/kWh (real rate)
- Internal Rate of Return (IRR) = 7.6% with Renewable Energy Certificates (RECs) and based on industrial electricity sell price

In order to compare offshore wave power economics to shore based wind, which reached a installed capacity base of about 40,000 MW in 2004, industry standard learning curves were

[1] For the first 103 MW plant assuming a regulated utility generator owner, 20 year plant life and other assumptions documented in Reference 3

applied. The results indicate that, even with worst-case assumptions, the economics of wave power compares favorable to wind power at all equal cumulative production levels.

Offshore wave energy electricity generation is a new and emerging technology. The first time electricity was provided to the electrical grid from an offshore wave power plant occurred in early August, 2004 by the full scale preproduction OPD Pelamis prototype in the UK. Many important questions about the application of offshore wave energy to electricity generation remain to be answered, such as:

- There is not a single wave power technology. It is unclear at present what type of technology will yield optimal economics. It is also unclear at present at which size these technologies will yield optimal economics.
- Given a device type and rating, what capacity factor is optimal for a given site?
- Will the installed cost of wave energy conversion devices realize their potential of being much less expensive per COE than solar or wind?
- Will the performance, reliability and cost projections be realized in practice once wave energy devices are deployed and tested?

E2I EPRI Global makes the following specific recommendations to the Oregon State Electricity Stakeholders relative to the Douglas County pilot demonstration plant:

1. Encourage the ongoing R&D at universities such as University of Massachusetts, MIT and Woods Hole Oceanographic Institute
2. Coordinate efforts to attract a pilot feasibility demonstration wave energy system project to the Massachusetts coast
3. Now that the project definition study is complete and a compelling case has been made for investing in wave energy in Massachusetts, proceed to the next phase of the Project

   If this recommendation cannot be implemented at this time (due to lack of funding or other reason), E2I EPRI Global recommends that the momentum built up in Phase 1 be sustained in order to bridge the gap until Phase II can start by funding what we will call Phase 1.5 with the following tasks:

   a. Tracking potential funding sources
   b. Tracking wave energy test and evaluation projects overseas (primarily in the UK, Portugal and Australia) and in Hawaii
   c. Tracking status and efforts of the permitting process for new wave projects
   d. Track and assess new wave energy devices
   e. Establish a working group for the establishment of a permanent wave energy testing facility in the U.S.

4. Build collaboration with other states with common goals in offshore wave energy.

In order to stimulate the growth of ocean energy technology in the United States and to address and answer the techno-economic challenges, we recommend the following take place:

- Federal and state recognition of ocean energy as a renewable resource and that expansion of an ocean energy industry in the U.S. is a vital national priority
- Creation of an ocean energy program within the Department of Energy's Energy Efficiency and Renewable Energy division
- DOE works with the government of Canada, Australia, the UK and on nations on an integrated bi-lateral ocean energy strategy.
- The process for licensing, leasing, and permitting renewable energy facilities in U.S. waters must be streamlined
- Provision of production tax credits, renewable energy credits, and other incentives to spur private investment in Ocean Energy technologies and projects.
- Provision of adequate federal funding for ocean energy R&D and demonstration projects.
- Ensuring that the public receives a fair return from the use of ocean energy resources and that development rights are allocated through an open, transparent process that takes into account state, local, and public concerns.

2. Site Selection

Cape Cod was selected as an area for locating an offshore wave power plant. The land fall of the power cable would occur at Le Count Hollow Beach. Fabrication and assembly would occur at one of the larger ports off the coast of Massachusetts or Maine. Operation and Maintenance can be carried out in Wellfleet, which is in close proximity to the deployment site. No easement to land a power cable has been identified, although it is likely that easements such as sewer outfalls exist in this area. The pilot plant can be connected to the grid close to shore, by simply tapping into a local distribution line. For a commercial size plant, grid interconnection can occur at the Wellfleet substation. Upgrades on 5km of transmission line will likely be required to interconnect the wave farm to the nearby 115kV transmission line. Figure 1 shows the high voltage power line route across Cape Cod.

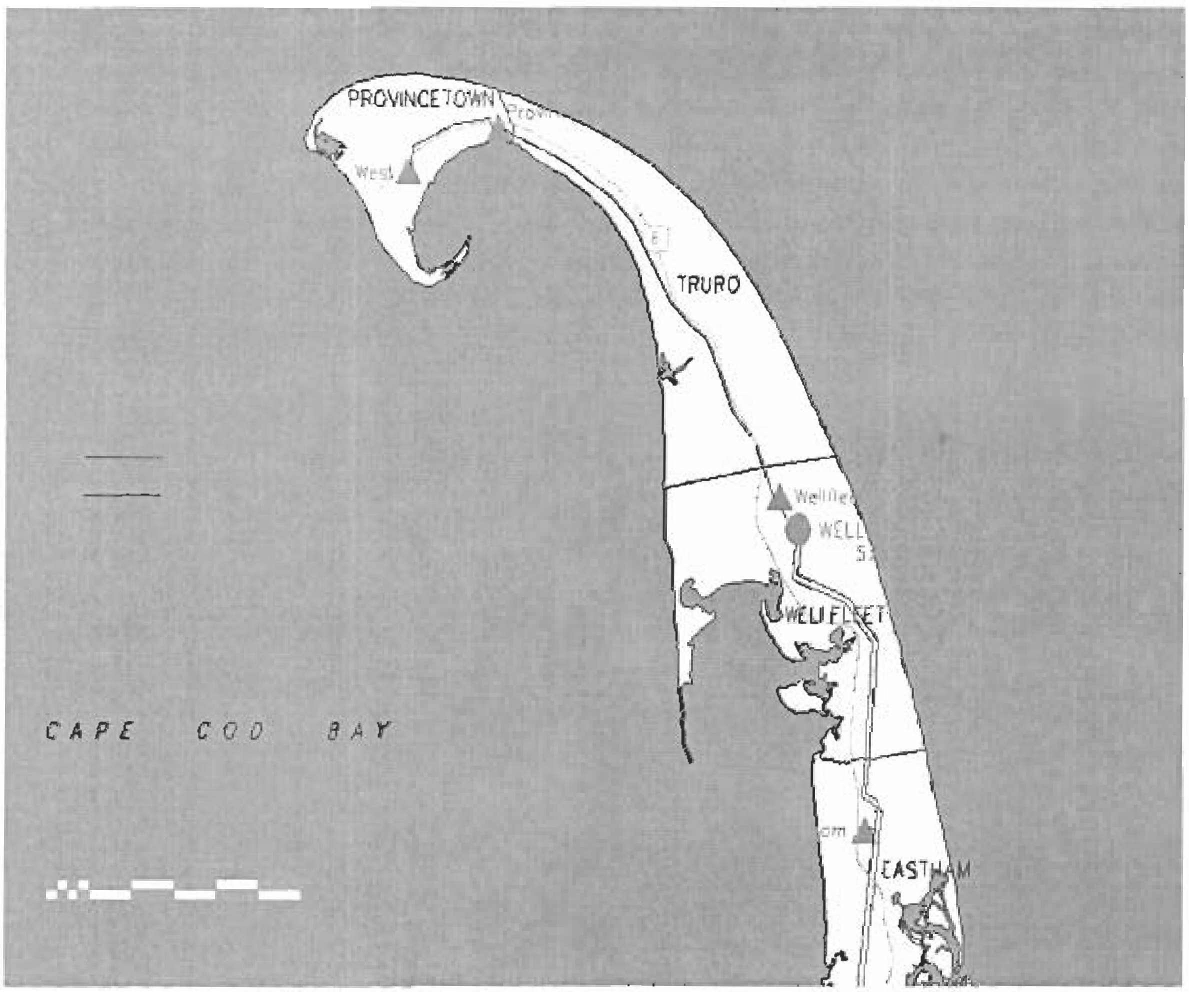


Figure 1: Cape Cod Power Transmission Infrastructure

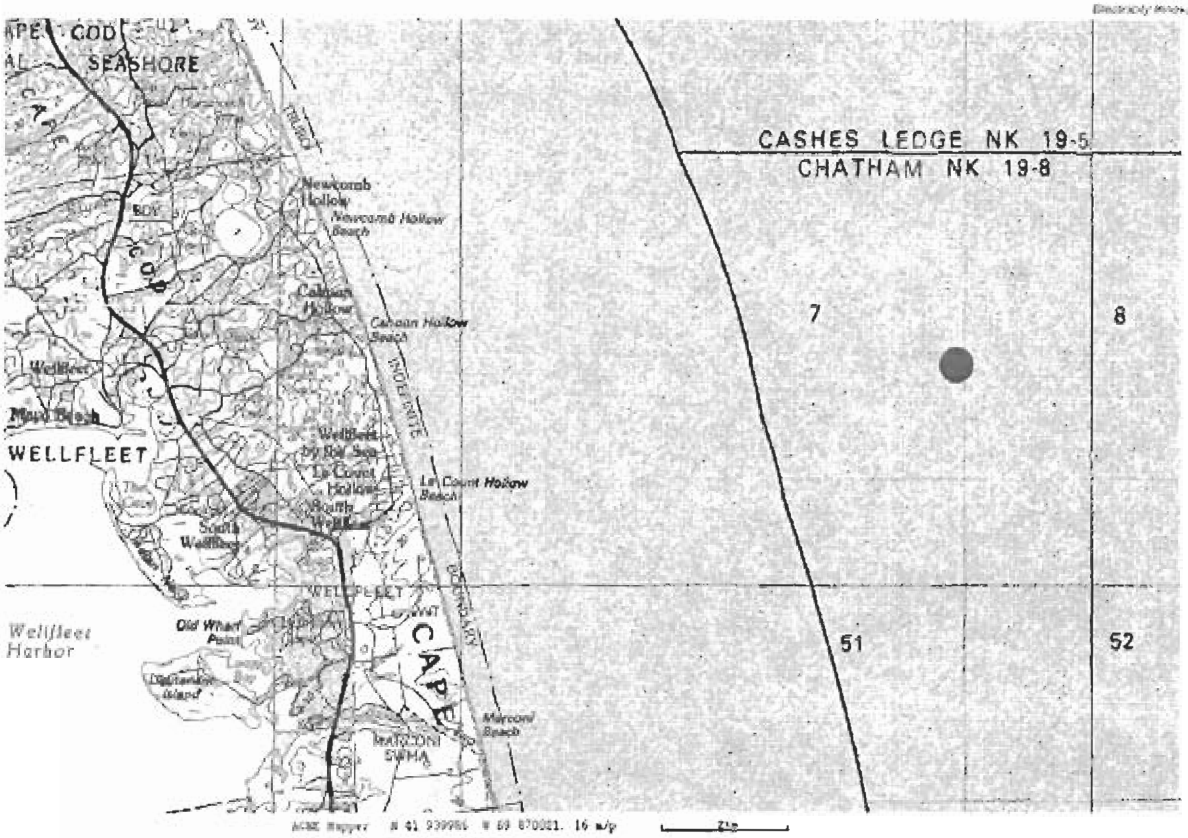


Figure 2: Wave Farm Deployment Site

The dot in Figure 2 shows the deployment site. It is located 9.1km from the beach at a water depth of 50m-60m. Figure 3 shows the local electrical interconnection points.

Figure 3 is a zoomed in map of Figure 2 to show the location of the cable landing and grid interconnection. The dot indicted as #1 is the cable shore crossing site and dot #2 shows the location of the Wellfleet substation.

Ocean floor sediments along the proposed cable route and at the deployment site consist mostly of sand, which allows the sub-sea cable to be buried appropriately and provides adequate soft sediments to use the Pelamis standard mooring configuration. Detailed bathymetry and geotechnical assessments will need to be carried out in a detailed design and engineering phase. Special attention will need to be paid to identify potential obstacles such as large rock formations in the cable route and at the deployment location. This is accomplished by using a combination of side scan radar, sub-bottom profiler, local dives and sediment sampling.

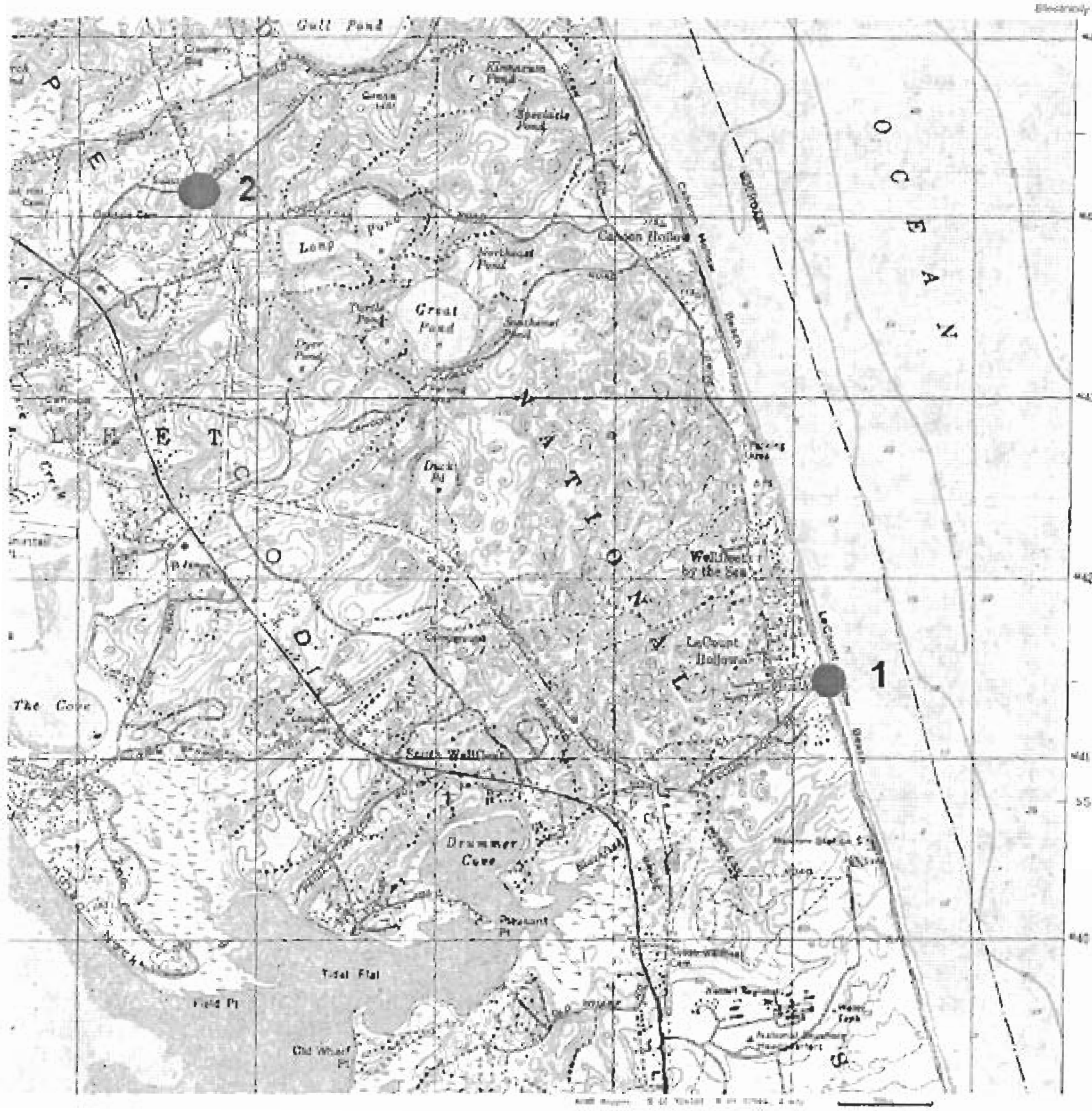


Figure 3: Cable Landing and Grid Interconnection

The deployment features the following relevant parameters:

Water Depth at Deployment Site:	50-60 m
Distance from shore to 12kV line:	500 m
Subsea Cable Length:	9.1 km
Total Cable Length Required:	9.6 km
Distance to Shore:	9.1 km
Overland Transmission Substation-Cable landing Site:	5 km
Ocean Floor Sediments:	Sand
Transit Distance to Wellfleet for O&M:	72 km

3. Wave Energy Resource Data

In order to characterize the wave resource at the proposed site, the NDBC 44018 wave measurement buoy was chosen to obtain wave data from. Only a single year of measurement data was available from this measurement station. Below are some key results of the reference measurement station and characterization of the wave climate. The measurement buoy is in close proximity to the proposed deployment site. As a result, the measurements are representative of the wave climate that the wave power units will experience. Figure 4 shows the average monthly wave energy power flux (in kW/m) Scatter tables for the wave energy resource were created for each month and used to estimate the power production of Pelamis as described in Section 6.

Measurement buoy:	NDBC 44018
Station Name:	SE Cape Cod
Water depth:	74 m
Coordinates:	41° 15'30'' N 69° 17'40'' W
Data availability:	1 year (2003)
Maximum Significant Wave Height (Hs):	7.6m
Maximum Significant Wave Period (Tp):	11.43 s
Average Wave Power Density (kW/m):	13.8kW/m

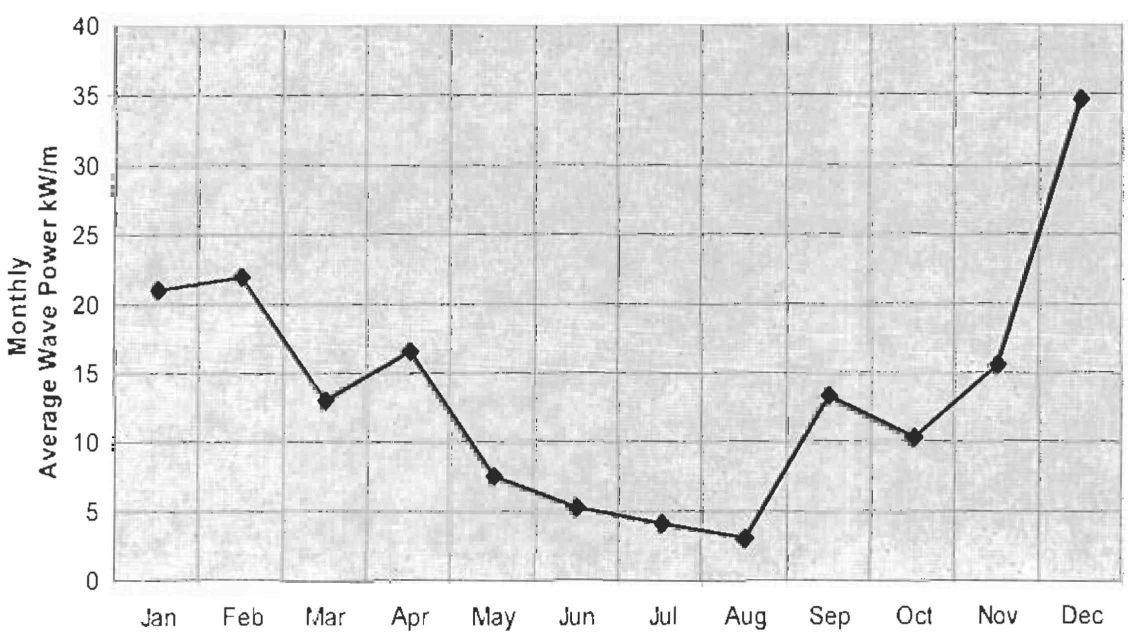


Figure 4: Monthly Average Wave Power Flux (kW/m)

4. The Technologies

The WEC device chosen for the Massachusetts point design is the Pelamis from Ocean Power Delivery (OPD). The device consists of a total of 4 cylindrical steel sections, which are connected together by 3 hydraulic power conversion modules (PCM). Total length of the device is 120m and the device diameter is 4.6m. Figure 5 shows the device being tested off the Scottish coast. Individual units are arranged in wave farms to meet specific energy demands in a particular site as illustrated in Figure 6.

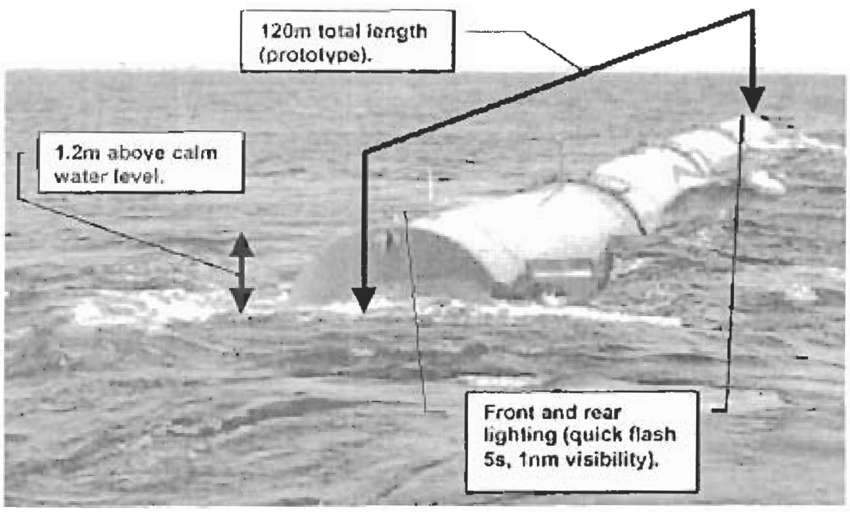


Figure 5: Pelamis pre-production prototype undergoing sea-trials

Figure 6: A typical Pelamis wave farm

The following sections provide a high level overview of the different subsystems that are device specific. Subsystems covered include the power conversion modules (PCM), the structural steel sections and the mooring system. The summary table below shows the key specifications of the Pelamis.

Table 1: Pelamis Device Specifications

Structure	
Overall Length	123 m
Diameter	4.6m
Displacement	700 tons
Nose	5m long conical drooped
Power Take Off	3 independent PCM's
Total Steel Weight	380 tons
Power Conversion Module (PCM)	
Power Take Off	4 x hydraulic rams (2 heave, 2 sway)
Ram Speed	0 – 0.1 m/s
Power Smoothing Storage	High pressure Accumulators
Working Pressure	100 – 350 bars
Power Conversion	2 x variable displacement motors
Generators per PCM and Speed	2 x 125kW and 1,500 rpm
Power	
Generator Type /Rated Power	Asynchronous /750kW
System Voltage	3-phase, 415/690VAC 50/60Hz
Transformer	950kVA step up to required voltage
Site Mooring	
Water depth	> 50m
Current Speed	< 1 knot
Mooring Type	Compliant slack moored

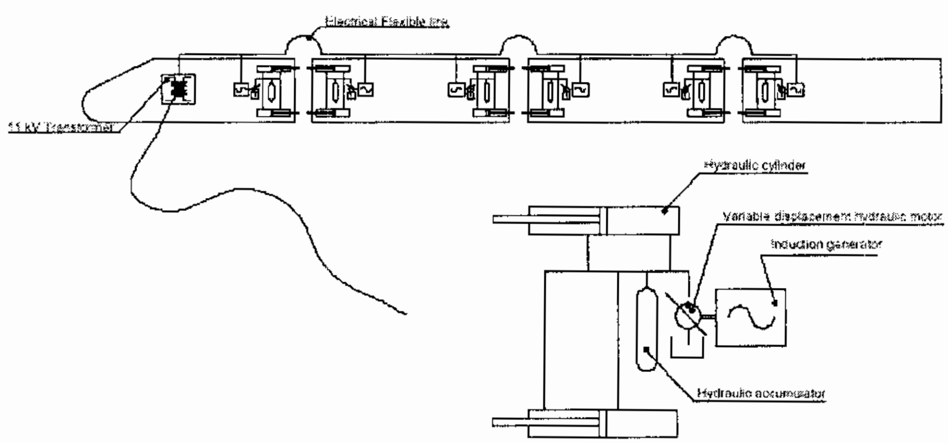


Figure 7: Pelamis Power Conversion Train

The Power Conversion Module (PCM)

As illustrated in Figure 7, a total of 3 power conversion modules (PCM's) connect the 4 individual steel tubes forming a Pelamis device. Each PCM contains a heave and sway joint. The modular power-pack is housed in a second fully sealed compartment behind the ram bay so that in the event of seal failure only the hydraulic rams are immersed. Access to all system components is via a hatch in the top of the power conversion module. Maximum individual component weight is less than 3 tons to allow replacement using light lifting equipment.

The wave-induced motion of each joint is resisted by sets of hydraulic rams configured as pumps. These pump oil into smoothing accumulators which then drain at a constant rate through a hydraulic motor coupled to an electrical generator. The accumulators are sized to allow continuous, smooth output across wave groups. An oil-to-water heat exchanger is included to dump excess power in large seas and provide the necessary thermal load in the event of loss of the grid. Overall power conversion efficiency ranges from around 70% at low power levels to over 80% at full capacity. Each of the three generator sets are linked by a common 690V, 3 phase 'bus' running the length of the device. A single transformer is used to step-up the voltage to an appropriate level for transmission to shore. High Voltage power is fed to the sea bed by a single flexible umbilical cable, then to shore via a conventional sub-sea cable.

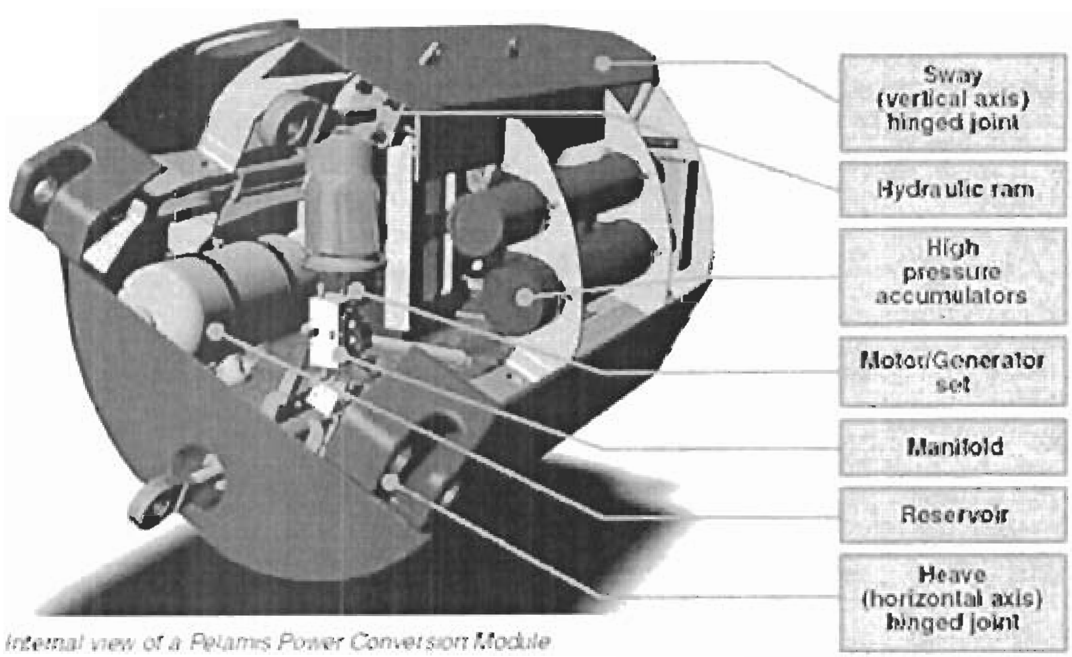


Figure 8: Internal View of the Pelamis PCM

Tubular Steel Sections

There are a total of 4 tubular steel sections, which are the main structural elements of the device. Each steel section is 25m long and weighs roughly 70tons. The main tube sections are manufactured in segments using steel plates that are rolled into shape as shown in Figure 9. Once formed, individual sections are welded together to form a segment. This manufacturing process is extensively in the wind industry to manufacture wind turbine towers. The process can be automated and lends itself well to cost reduction.

Cast end caps on the steel tubes incorporate hinges, which then interconnect to the Power Conversion Modules. In order to properly ballast the device, sand is added.

Alternative construction materials were evaluated under a contract by the Department of Trade and Industry. Materials analyzed and compared to each other were steel, pre-tensioned concrete and GRP (filament wound composite). Out of the 3 options, concrete emerged as the preferred option (Reference 5).

Figure 9: Manufacturing Steel Tubular Sections

Mooring System

The mooring arrangement of Pelamis needs to be designed specifically for the site conditions. Similar to a wind turbine foundation, which needs to be type approved, the Pelamis mooring system needs to be designed by OPD and adapted to specific site conditions. Survival conditions, maximum current velocity, water depth, seafloor soil densities and other factors will need to be considered in a detailed design phase.

For the purpose of this project, the reference mooring system used for Ocean Power Delivery prototype testing was used to establish a costing base case as shown in Figure 10.

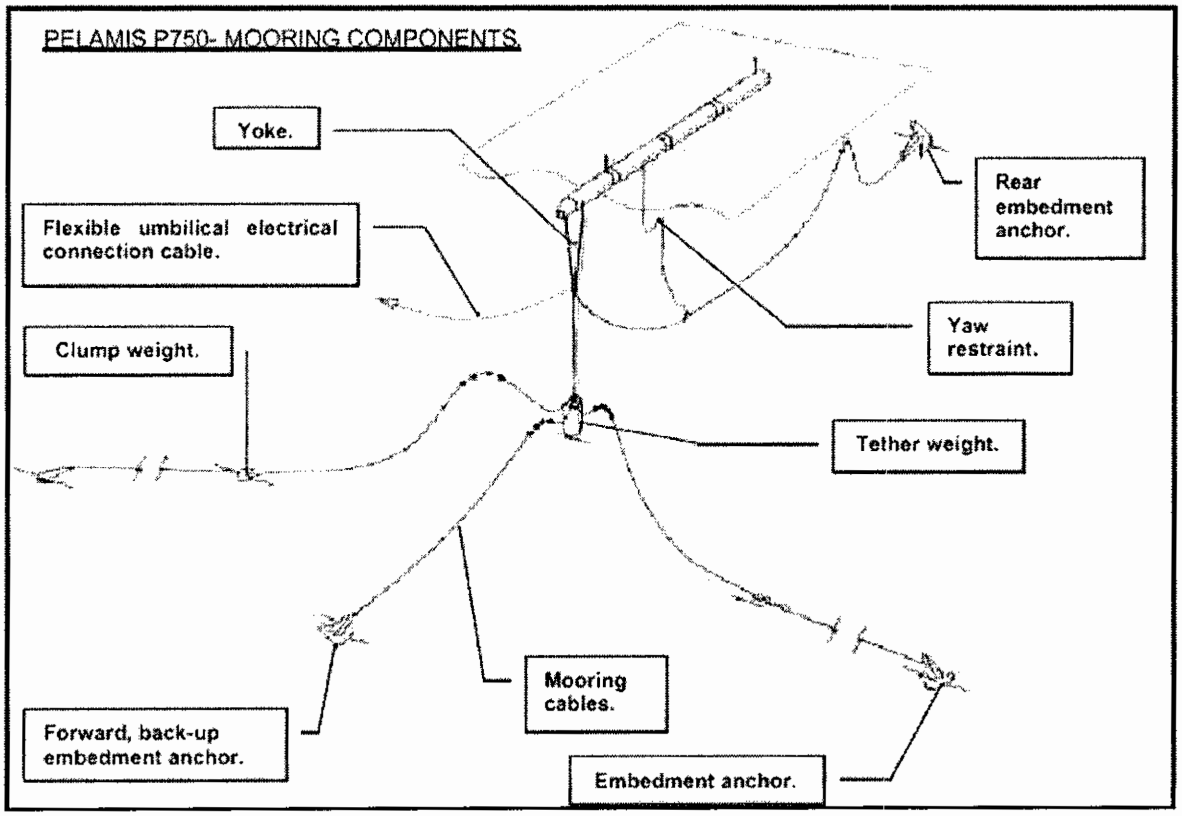
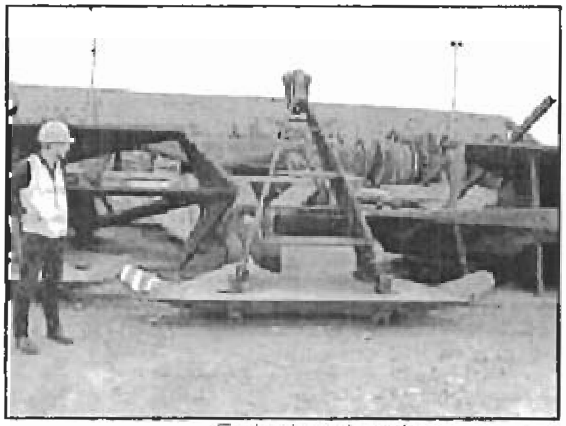


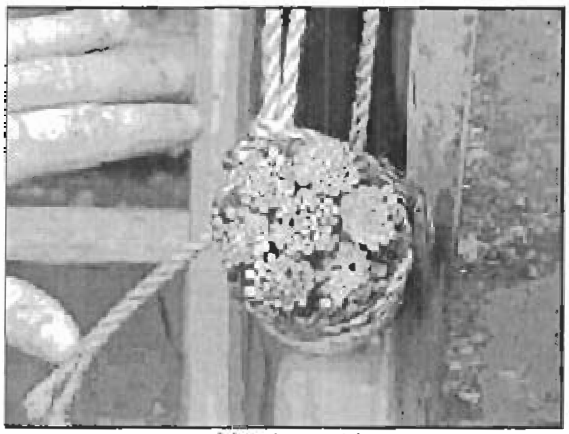
Figure 10: Mooring Arrangement of Pelamis

As shown in Figure 10, the Pelamis mooring system is a catenary type mooring using a combination of steel wire, chain, dead weights and embedment anchors. The following four pictures of Figure 10 show some of the individual mooring elements in an assembly yard to provide the reader with an understanding of the size of these individual components.



Embedment anchor.

Clump weight.



Mooring cable.

Figure 11: Mooring Illustrations

Electrical Interconnection & Communication

Each Pelamis device houses a step-up transformer to increase the voltage from generator voltage to a suitable wave farm interconnection voltage. The choice of the voltage level is driven by the grid interconnection requirements and the wave farm electrical interconnection design. A flexible riser cable is connecting the Pelamis to a junction box, sitting on the ocean floor. If multiple devices are connected together, they are daisy-chained by a jumper cable which runs from one device to the next. Only at certain strong-points the electrical cable is then brought to the ocean floor. This approach reduces the number of riser cables required and makes the cabling more accessible for maintenance from the surface. Riser and jumper cables undergo a large number of cyclic loadings and it is likely that they will need to be replaced after 10 years of operation.

The cables used are 3-phase cables with a fiber core. This fiber core is used to establish reliable communication between the devices and a shore-based supervisory system. Remote diagnostic and device management features are important from an O&M stand-point as it allows to pin-point specific issues or failures on each Pelamis unit, reducing the physical intervention requirements on the device and optimizing operational activities. Operational activities offshore are expensive and minimizing such intervention is a critical component of any operational strategy in this harsh environment. A wireless link is used as a back-up in case primary communication fails.

Subsea Cabling

Umbilical cables to connect offshore wave farms (or wind farms) to shore are being used in the offshore oil & gas industry and for the inter-connection of different locations or entire islands. In order to make them suitable for in-ocean use, they are equipped with water-tight insulation and additional armor, which protects the cables from the harsh ocean environment and the high stress levels experienced during the cable laying operation. Submersible power cables are vulnerable to damage and need to be buried into soft sediments on the ocean floor. While traditionally, sub-sea cables have been oil-insulated, recent offshore wind projects in Europe, showed that the environmental risks prohibit the use of such cables in the sensitive coastal environment. XLPE insulations have proven to be an excellent alternative, having no such potential hazards associated with its operation. Figure 12 shows the cross-sections of armored XLPE insulated submersible cables.

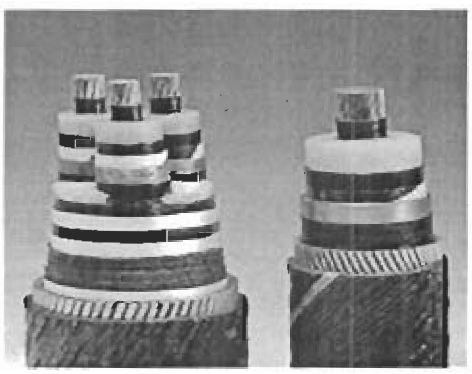


Figure 12: Armored submarine cables

For this project, 3 phase cables with double armor and a fiber core are being used. The fiber core allows data transmission between the Pelamis units and an operator station on shore. In order to protect the cable properly from damage such as an anchor of a fishing boat, the cable is buried into soft sediments along a predetermined route. If there are ocean floor portions with a hard bottom, the cable will have to be protected by sections of protective steel pipe, which is secured by rock bolts.

An important part of bringing power back to shore is the cable landing. Existing easements should be used, such as the easement associated with the existing effluent pipe at the International Paper facility. If they do not exist, directional drilling is the method with the least impact on the environment. Directional drilling is a well established method to land such cables from the shoreline into the ocean and has been used quite extensively to land fiber optic cables on shore.

Onshore Cabling and Grid Interconnection

Traditional overland transmission is used to transmit power from the shoreline to a suitable grid interconnection point. Grid interconnection requirements are driven by local utility requirements. At the very least, breaker circuits need to be installed to protect the grid infrastructure from system faults.

Procurement and Manufacturing

For the single-module Pelamis pilot plant, it was assumed that the 3 Power Conversion Modules are procured from Ocean Power Delivery (OPD) and is shipped from the UK to Massachusetts and that the structural steel sections are built locally in an appropriate shipyard. A number of shipyards exist along the Maine and Massachusetts coastline, capable of manufacturing the large steel sections. Figure 13 shows the Pelamis prototype under construction in Scotland. The picture on the left shows a hydraulic ram being mounted in one of the Power Conversion Modules. The picture on the right shows the large tubular steel sections of the Pelamis being completed.

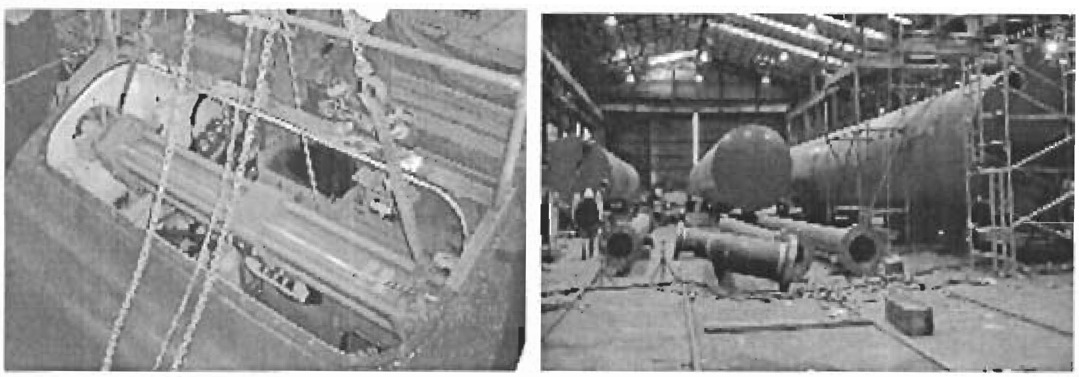


Figure 13: Manufacturing the Pelamis

Mooring components such as wire, chain and the various anchor components will be purchased from local manufacturers and assembled in a local staging site before deployment. Sub-sea cables, circuit breakers etc. will also be purchased from US based manufacturers.

At the commercial scale envisioned, it will make economic sense to establish local manufacturing facilities for the Power Conversion Modules (PCM's). A number of capable manufacturing facilities exist in Massachusetts, which would be able to build and test these modules. This will allow for a large amount of US content in the devices and bring benefits to the local economy.

Wellfleet is used as the location to carry out annual overhauls and 10-year refits, which will be required to replace major subsystems.

Installation Activities

Installation and operational offshore activities require special equipment such as anchor handler vessels, barges and heavy uplift cranes. In order to understand the offshore installation and removal activities and their impacts on cost, detailed process outlines were created to be able to estimate associated resource requirements. Results were verified with Ocean Power Delivery who deployed a prototype device this year, offshore operators and Sea Engineering Hawaii who managed the installation of Ocean Power Technologies Power Buoy in Hawaii. The major installation activities for both pilot demonstration plant and commercial wave farm are:

1. Pulling Power Cables through existing Effluent Line and grid interconnection
2. Installation of sub-sea cables
3. Installation of Mooring System
4. Commissioning and Deployment of Pelamis

Offshore handling requirements were established based on technical specifications supplied by Ocean Power Delivery. Figure 14 below shows the anchor handler vessel used for the installation of the prototype in the UK. It is a standard vessel used in the UK offshore Oil & Gas industry.

For the commercial plant, it proved to be cost effective to include a AHATS class vessel in the project cost and hire dedicated staff to carry out operational activities. Figure 15 shows the prototype Pelamis being towed to its first deployment site off the coast of Scotland.

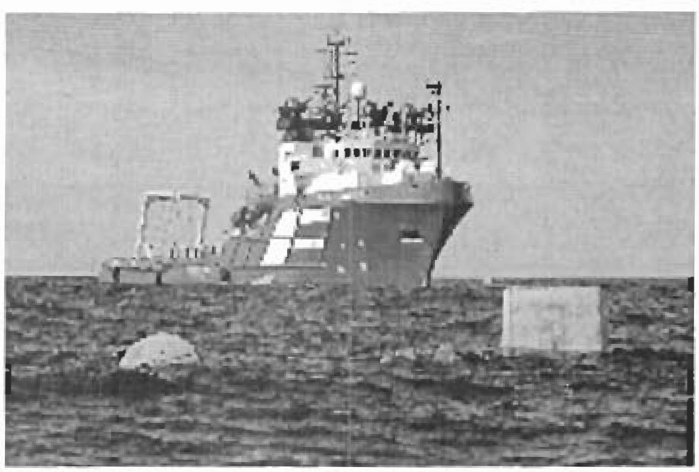


Figure 14: AHATS class vessel used for prototype installation in UK

Operational stand-by time was included in form of a weather allowance. Weather allowances depend on many factors such as vessel capabilities, and deployment and recovery processes.

Comparable numbers from the North Sea offshore oil & gas industry were adapted to local conditions, based on feedback from local offshore operators.

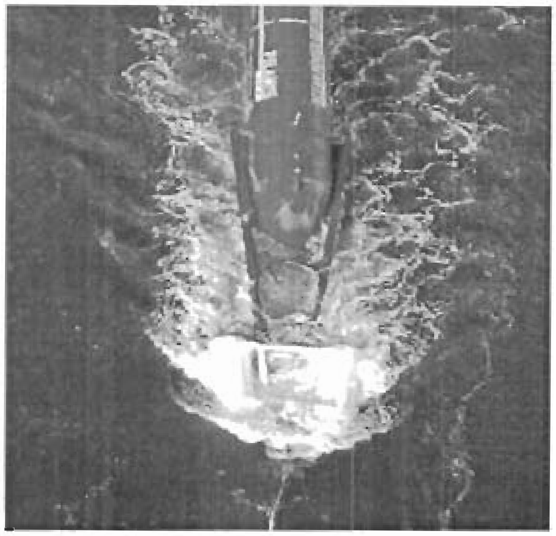


Figure 15: Towing the Pelamis P-750

Operational Activities

Pelamis was designed with a minimum amount of physical intervention in mind. Sophisticated remote monitoring capabilities allow the operator to monitor the device and, in case of a failure, isolate the fault to determine the exact problem and if required schedule physical intervention. In addition, the device features many levels of redundancies which will reduce the need to immediately respond to a failure.

The devices maintenance strategy is to completely detach the device from its moorings, tow the unit into a nearby harbor and carry out any repair activities along a dock-side. Initially it is envisioned, that the device is removed every year for maintenance activities. As the technology becomes more mature, these regular maintenance activities will become more infrequent. For the commercial reference plant, we assumed that removal for scheduled maintenance occurs every 2 years.

Every 10 years, the device will be recovered for a complete overhaul and refit. For that purpose, it will need to be de-ballasted and completely recovered to land. It is likely that only some touch-up painting will be required and the exchange of some of the power take off elements, such as hydraulic rams will take place at that point. The device will also need to be inspected at that time by the American Bureau of Shipping (ABS) or a related agency.

5. System Design – Pilot Plant

The outline below (Figure 16) shows the electrical setup of the demonstration pilot plant. A single Pelamis WEC device is floating on the surface and moored in a water depth of 50m – 60m. An umbilical riser cable is connecting the Pelamis to a junction box on the ocean floor. From this junction box, a double armored 3 phase cable is laid on the ocean floor, buried into the soft sediments on the ocean floor. The cable landing site will be at the Le Count Hollow Beach. It is assumed, that a suitable 12kV distribution line is in close proximity to the cable landing site. There is sufficient development in the area that it is highly probable such a distribution line is available in close proximity.

The cable is landed on shore using directional drilling. Directional drilling is well established to land cables to shore and is viewed as the method, which has the least impact on the environment. Detailed assessment of the local electrical infrastructure will be required in subsequent project phases.

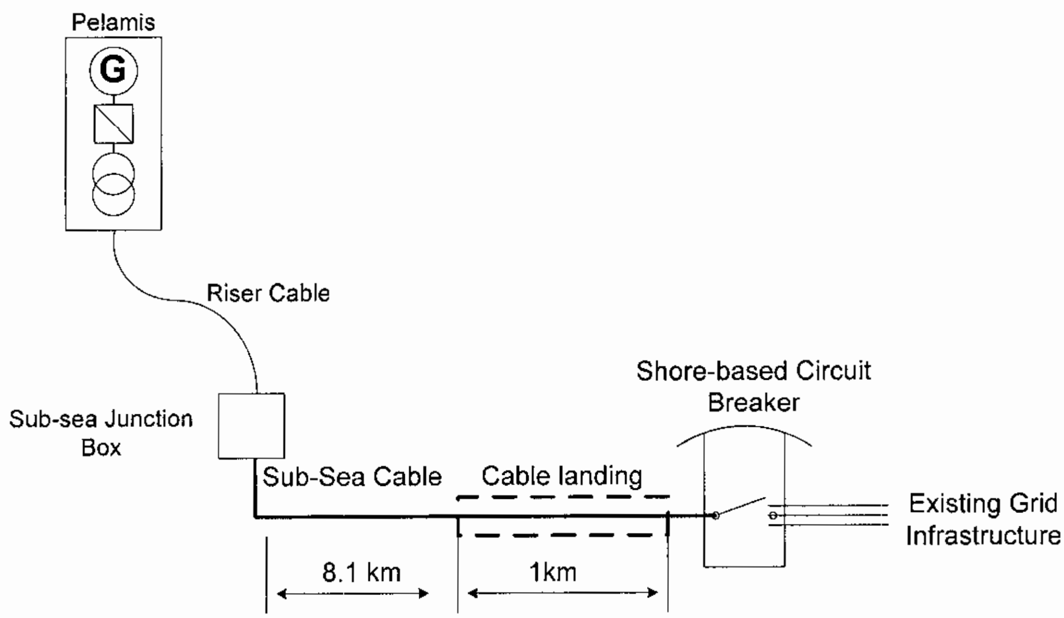


Figure 16: Electrical Interconnection of a single unit Pelamis Pilot Plant

6. System Design - Commercial Scale Wave Power Plant

While the conceptual design of the pilot plant focused on finding existing easements, allowing the installation of a small demonstration system in a cost effective manner, the commercial scale wave farm design focused on establishing a solid costing base case, and assessing manufacturing and true operational costs for a large plant. The commercial scale cost numbers were used to compare energy costs to commercial wind farms to come to a conclusion on the cost competitiveness of wave power in this particular location.

The following subsections outline the electrical system setup, the physical layout and the operational and maintenance requirements of such a deployment. In order to meet the target output of 300,000 MWh/year, a total of 206 Pelamis units are required.

Electrical Interconnection and Physical Layout

As shown in Figure 17, the commercial system uses a total of 4 clusters, each one containing 51 Pelamis units, connected to sub-sea cables. Each cluster consists of 3 rows with 17 devices per row. The 4 sub-sea cables are connecting the 4 clusters to shore as shown in Figure 17. The electrical interconnection of the devices is accomplished with flexible jumper cables, connecting the units in mid-water. The introduction of 4 independent sub-sea cables and the interconnection on the surface will provide some redundancy in the wave farm arrangement.

The 4 clusters are each 2.58 km long and 1.8 km wide, covering an ocean stretch of roughly 10 km. The 4 arrays and their safety area occupy roughly 18 square kilometers. Further device stacking of up to 4 rows might be possible reducing the array length, but is not considered in this design, as subsequent rows of devices will likely see a diminished wave energy resource and therefore yield a lower output. Such effects and their impacts on performance are not well understood at present. It is not clear at present what the best interconnection voltage for this site would be. 26kV was assumed to be the system voltage.

Based on the above setup the following key site parameters emerged:

Array Length	10 km
Array Width	1.8 km
Device Spacing	150m
Number of Rows	3
System Voltage	26kV
Sub-sea cable specs	26kV / 40MVA / 3-phase with fiber optic core

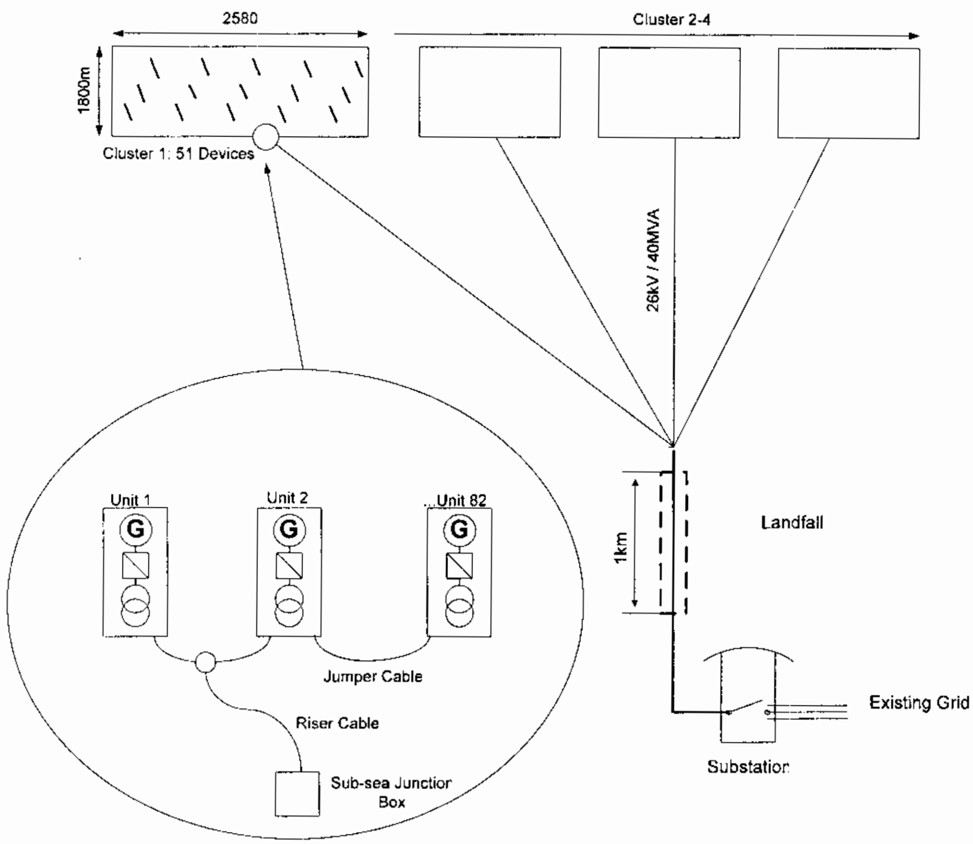


Figure 17: Overall System Layout and Electrical Connections

Operational and Maintenance Requirements

General operational activities are outlined in a previous section. It made economic sense for this wave farm to include an AHATS class vessel in the capital cost of the project. Based on the workload, the vessel will be at 100% capacity during the installation phase of the project and then its usage will drop to less then 50% to operate the wave farm.

This type of vessel has sufficient deck space to accommodate the heavy mooring pieces and a large enough crane to handle the moorings. In addition the vessel has dynamic positioning capabilities and is equipped for a 24-hour operation. Based on the work loads involved with O&M and 10-year refit operation a total full-time crew of 20 is required. This includes onshore personnel to carry out annual maintenance activities and 10-year refits.

O&M activities can be carried out at a suitable pier side in Wellfleet, with the device remaining in the water. For the 10-year refit, the device will need to be recovered to land. Budget allowances were given to accommodate infrastructure modifications to streamline operational tasks.

7. Device Performance

The device performance was assessed based on data supplied by the manufacturer and the wave climate (outlined in previous section). The following summarizes the projected device performance as described in Section 2 off the coast of Cape Cod.

Transmission line losses for the sub-sea cable from the offshore farm to the grid interconnection point at the substation were ignored as they are not significant at the design voltage levels used and can only be estimated in a detailed design phase.

Scatter or joint probability diagrams for the wave energy resource were created for each month and used for power production calculations. Figure 18 shows the average power (kW) delivered to the grid by a single Pelamis WEC Device sited as described in Section 2.

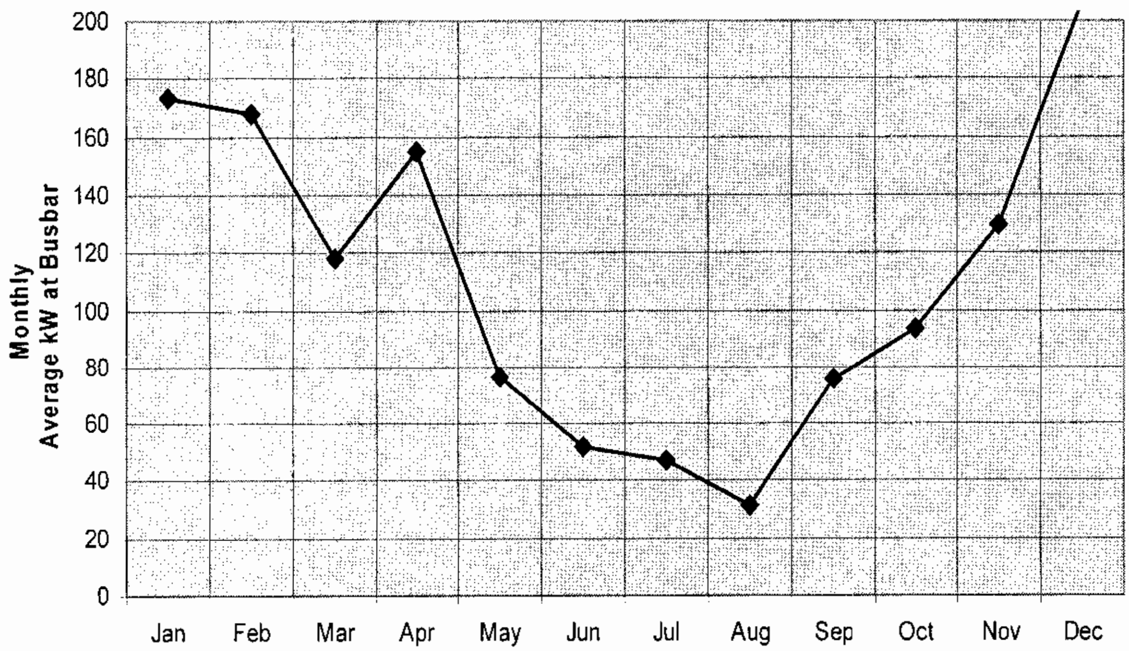


Figure 18: Monthly average power delivered to bus bar – Pilot Plant

A scatter diagram of the annual and monthly wave energy available at the deployment site was developed using long-term statistics from the Cape Cod NDBC 44018 wave measurement buoy. The scatter diagram for the annual energy is shown in Table 2.

Table 2: Massachusetts Site Annual occurrence of hours per sea-state

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total annual hours
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
6.75	7.25	7	0	0	0	0	0	0	0	1	6	2	0	0	0	0	0	0	0	9
6.25	6.75	6.5	0	0	0	0	0	0	0	8	2	4	0	0	0	0	0	0	0	14
5.75	6.25	6	0	0	0	0	0	0	2	10	4	0	5	0	0	0	0	0	0	21
5.25	5.75	5.5	0	0	0	0	1	0	7	6	15	9	3	0	0	0	0	0	0	41
4.75	5.25	5	0	0	0	0	1	4	9	6	18	4	6	0	0	0	0	0	0	48
4.25	4.75	4.5	0	0	0	0	9	14	11	8	25	6	3	1	0	0	0	0	0	77
3.75	4.25	4	0	0	0	3	23	31	24	27	34	5	0	2	0	0	0	0	0	149
3.25	3.75	3.5	0	0	0	11	45	74	35	30	41	11	6	7	0	0	0	0	0	260
2.75	3.25	3	0	0	0	45	80	132	52	52	54	17	6	8	5	3	0	0	0	454
2.25	2.75	2.5	0	0	16	142	127	190	96	101	72	17	22	16	4	1	0	0	0	804
1.75	2.25	2	0	1	91	270	205	227	133	102	119	34	19	23	9	2	1	0	0	1,236
1.25	1.75	1.5	0	35	181	298	338	359	152	135	137	40	36	22	4	1	0	0	0	1,738
0.75	1.25	1	19	163	266	442	507	616	275	188	115	20	7	8	2	0	0	0	0	2,628
0.25	0.75	0.5	31	65	116	179	240	295	107	73	38	2	0	8	9	1	0	0	0	1,164
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		8,766	*50*	*264*	*670*	*1,390*	*1,576*	*1,942*	*903*	*747*	*682*	*171*	*113*	*95*	*33*	*8*	*1*	*0*	*0*	8,645

Table 3: Pelamis Wave Energy Conversion Absorption Performance (kW)

Hs (m)	Tp (s) 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20
10	750	750	750	750	750	750	750	750	750	750	750	750	711	750	750	738	734
9.5	750	750	750	750	750	750	750	750	750	750	750	750	691	750	710	694	662
9	750	750	750	750	750	750	750	750	750	750	750	750	670	746	668	650	592
8.5	750	750	750	750	750	750	750	750	750	750	750	750	650	699	626	606	551
8	750	750	750	750	750	750	750	750	750	750	750	750	630	653	584	562	509
7.5	750	750	750	750	750	750	750	750	750	750	750	748	610	607	542	518	467
7	750	750	750	750	750	750	750	750	750	750	750	692	566	560	500	474	425
6.5	750	750	750	750	750	750	750	750	750	750	723	592	617	513	458	430	384
6	597	630	663	684	750	750	750	750	750	750	616	633	525	476	396	386	329
5.5	428	497	566	612	750	750	750	750	750	635	642	532	482	400	399	341	322
5	259	364	469	539	750	750	750	750	644	641	531	482	399	394	330	308	274
4.5	94	233	371	467	735	744	738	634	626	520	473	390	382	319	299	250	208
4	105	216	326	394	632	616	583	585	494	454	374	361	339	283	236	197	153
3.5	0	86	211	326	484	577	568	502	421	394	330	312	260	216	196	164	140
3	0	91	180	246	402	424	417	369	343	331	275	229	208	173	144	120	93
2.5	0	7	93	171	279	342	351	320	274	230	210	174	145	120	100	84	65
2	0	0	66	109	199	219	225	205	195	162	135	112	93	77	64	54	41
1.5	0	0	26	62	112	141	143	129	110	91	76	63	52	43	36	30	23
1	0	0	11	27	50	62	64	57	49	41	34	28	23	0	0	0	0
0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The total energy in each sea state was calculated by multiplying each cell of the Pelamis performance scatter diagram (Table 3) with each corresponding cell in the hours of reoccurrence scatter diagram (Table 2). By summing up the two tables, the annual output (MWh/year) per Pelamis WEC device was derived. Pilot plant performance numbers are summarized in Table 4.

Table 4: Pilot Plant Pelamis Performance

Device Rated Capacity	750kW
Annual Energy Absorbed	1268 MWh/year
Device Availability	85%
Power Conversion Efficiency	80%
Annual Generation at bus bar	964 MWh/year
Average Power Output at bus bar	98 kW

The commercial plant performance was assessed using the pilot plants performance data as its basis. In addition certain performance improvements were considered. Based on well established wave theory, the Pelamis device is only absorbing a small fraction of its theoretical limit. An increase in performance by a factor of 2-3 is possible without significant changes to the device geometry. Although there are significant improvements possible, for the purpose of this study, only performance improvements were considered which could be achieved in the near future, without any additional research. Therefore, this 2-3x improvement is not considered in this study. The potential performance improvement is based on theoretical analysis of advanced strategies to actively tune the devices resonance period to the prevailing wave conditions. Readers interested in the tuning and control strategy topic are referred to "Ocean Waves and oscillating Systems" by Johannes Falnes, ISBM 0 521 78211 2 Hardback. The following shows the changes incorporated in the commercial Pelamis performance numbers:

- Changing the mooring configuration will yield a performance improvement of 37%. Design changes to achieve this performance increase are OPD commercially sensitive at this time. OPD states that this mooring configuration has been evaluated in wave tank tests and theoretical studies and is well quantified.

- The current Power Conversion Modules use standard off the shelf components. Customizing some of these components could increase the power conversion efficiency by more then 10%. The technologies to improve the conversion efficiency exist and are therefore included in the performance for the commercial plant.

- The rated capacity was changed to 500kW, because the 750kW design is overrated for the Massachusetts wave climate. The 500kW power conversion module is also reflected in the cost assessment of the power plant.

Table 5 summarizes the performance values for a commercial Pelamis module incorporating improvements as outlined above.

Table 5: Commercial Plant Pelamis Performance

Device Rated Capacity	500kW
Annual Energy Absorbed	1,738 MWh/year
Device Availability	95%
Power Conversion Efficiency	88%
Annual Generation at bus bar	1,453 MWh/year
Average Electrical Power at bus bar	166 kW
# Pelamis required to meet target 300,000 MWh/yr	206

8. Cost Assessment – Pilot Plant

The cost assessment for the pilot was carried out using a rigorous assessment of each cost center. Installation activities were outlined in detail and hourly breakdowns of offshore operational activity created to properly understand the processes and associated cost implications. Wherever possible, manufacturing estimates were obtained from local manufacturers. An uncertainty range was associated to each costing element and a Monte Carlo Simulation was run to determine the uncertainty of capital cost. Operational costs were not assessed in detail for the Pilot plant. This is a task that is scheduled for subsequent project phases. Cost centers were validated by Ocean Power Delivery, based on their production experience of their first full scale prototype machine, which was deployed in 2004.

Based on the above assumptions the following results in constant year 2004$ are presented:

Table 6: Cost Summary Table rounded to the nearest $1000

Cost Element	Pilot Plant	Basis
Onshore Transmission & Grid Interconnection	$694,000	(1)
Subsea Cables	$1,013,000	(2)
Pelamis Power Conversion Modules	$1,565,000	(3)
Pelamis Manufactured Steel Sections	$851,000	(4)
Pelamis Mooring	$243,000	(5)
Installation	$633,000	(6)
Construction Mgmt and Commissioning (10% of cost)	$500,000	(7)
Total Before Fed Inv Tax Credit and State Installation Tax Deduction	**$5,498,000**	
Federal 10% tax Credit	545,000	
State Installation Tax Deduction (9.5% tax rate)	60,000	
Total After Installation Tax Deduction	**$4,893,000**	

1) Cost includes a breaker circuit and double armored power cable being laid through existing easement in place. Cable cost is based on quotes from Olex cables.

2) Subsea cable cost is based on quotes from Olex cables. It includes a sub-sea, pressure compensated junction box, to connect the riser cable. This cost component could be reduced by $500,000 if direct drilling at land fall could be avoided by use of an existing easement

3) Based on estimate by Ocean Power Delivery. Shipping cost is included from Edinburgh (UK) to Reedsport Massachusetts based on quote by Menlo International.

4) Cost for 4 manufactured steel sections was estimated by using $2,850/per ton of manufactured steel. Each steel section of this unit weighs roughly 70 tons

(excluding ballast). This is consistent with OPD experience with manufacturing their pre-production machine and input from local manufacturers. It includes cast elements and protective coatings. Range of cost from different sources was $2,500/ton - $3,500/ton.

5) Based on OPD's experience with their pre-production prototype. Cross checks were performed using local construction management feedback.

6) Installation costs were estimated by a rigorous assessment of vessel handling requirements, breakdown of installation tasks, quotes from local operators for vessel cost, fuel and crew, and allowance for weather downtime.

7) Based on E2I EPRI Project Team experience managing like custom construction projects and commissioning to owner acceptance.

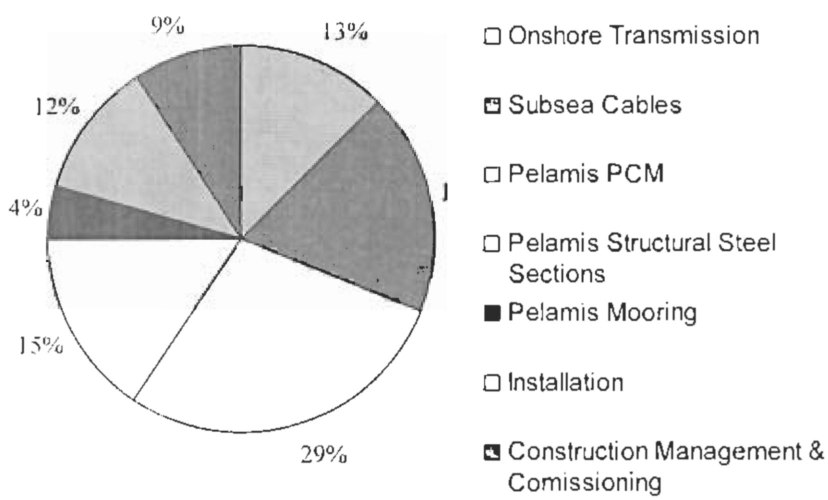


Figure 19: Pie Chart of cost centers for single unit installation

Cost uncertainties were estimated for each cost component and a Monte Carlo simulation was used to determine the likely capital uncertainty of the project. Figure 20 below shows the cost as a function of cost certainty as an S-curve. A steep slope indicates a small amount of uncertainty, while a flat slope indicates a large amount of uncertainty. It shows that the cost accuracy is within -20% to +22%. This bottom-up approach to uncertainty estimation compares to an initially estimated accuracy of -25% to +30% for a pilot scale plant based on a preliminary cost estimate rating (from the top-down EPRI model described in Ref 3).

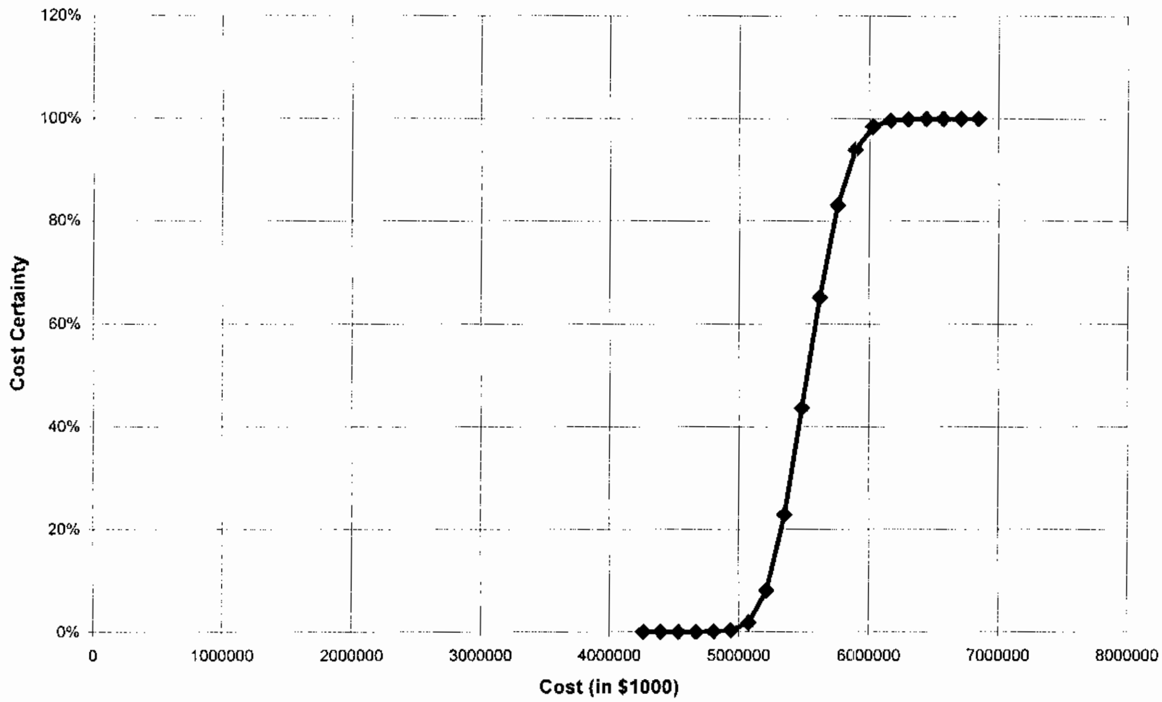


Figure 20: Capital cost uncertainty

9. Cost Assessment – Commercial Scale Plant

The cost assessment for the commercial wave power plant followed a rigorous assessment of each cost center. Instead of simply applying learning curves, a point design for the commercial plant using 206 devices was outlined and its cost estimated. For cost centers, which lend themselves well to cost reduction, outlines were created of how such cost reduction will be achieved. Installation activities were outline in detail and hourly breakdowns of offshore operational activity created to properly understand their impacts on cost and resources. Cost centers were validated by Ocean Power Delivery, based on their production experience of their first full scale prototype machine, which was deployed in 2004. Operational tasks and outlines were validated by local operators.

Table 7: Installed Cost Breakdown for Commercial Scale Plant

Cost Element	**206-Pelamis Device System**		**Basis**
Constant Dollar Year	2004	in %	
Installed Cost			
Onshore Transmission & Grid Interconnection	$6,000,000	2.4%	
Subsea Cables	$4,886,000	2.0%	
206 x Mooring Spread	$24,090,000	9.7%	(1)
206 x Power Conversion Modules	$128,536,000	51.5%	(2)
206 x Concrete Structural Sections	$50,429,000	20.2%	(3)
Facilities	$12,000,000	4.8%	(4)
Installation	$12,170,000	4.9%	(5)
Construction Mgmt and Commissioning (5% of cost)	$11,297,000	4.5%	(6)
Total Plant Cost	**$249,408,000**	**100%**	
Construction Financing Cost	$23,700,000		
Total Plant Investment	**$273,108,000**		
Yearly O&M			
Labor	$2,516,000	21.0%	(7)
Parts (2%)	$4,920,000	39.5%	(8)
Insurance (2%)	$4,920,000	39.5%	(9)
Total	**$12,355,000**	**100%**	
10-year Refit			
Operation	$10,570,000	41.0%	(7)
Parts	$15,962,000	59.0%	(7)
Total	**$26,531,000**	**100%**	

(1) The mooring spread is an assembly of standard elements and equipment. A moderate cost reduction of 30% was assumed (as compared to the prototype). This cost reduction can easily be achieved by purchasing in larger quantities.

(2) Three (3) Power Conversion Modules (PCM) are required for a single Pelamis unit. Cost of a hydro-electric power take off will be significantly lower then initial production units. The performance assessment for our reference site also shows that the PCMs are overrated and reducing the rated power to 500kW per device would yield a relatively small decrease in annual output. This is mainly attributed to the fact that the Massachusetts site has lower energy levels then UK sites for which the device was originally developed. Reference 6 shows that the cost for the three (3) PCM 500kW prototype unit in production volume is $289,00 for the power conversion train alone and another $234,000 for the manufactured steel enclosure, hinges and assembly for a total Pelamis unit cost (3 PCMs) of $523,000.

(3) The summary table in Reference 5 shows a production cost of $51,000 per tube or $204,000 per device excluding the end caps on the tubes. Including the end caps, the cost for the 4 concrete sections is $245,000 per Pelamis device. Concrete is widely used in the offshore industry and is considered the most reliable option among construction materials. However, it is important to understand that a design using concrete tubes will require design efforts up-front, to properly test the long-term fatigue characteristics of a particular design.

(4) Includes an AHATS class vessel, which is equipped to operate 24 hours per day and some provisions for dock modifications and heavy lift equipment.

(5) Installation cost was estimated by a rigorous assessment of vessel handling requirements, breakdown of installation tasks, quotes from local operators for vessel cost, fuel and crew and allowance for weather downtime.

(6) Construction management and commissioning cost was estimated at 5% of the plant cost based on discussions with experienced construction management organizations.

(7) The most cost effective approach to operate the wave power plant included an AHATS class vessel capable to operate effectively 24-hours per day. Based on a rigorous assessment of the tasks involved in operating the wave farm, it was concluded, that the vessel would be at less then 50% capacity. Shore-based and offshore operations and maintenance tasks were estimated and the results showed that a crew of 18 persons is required to operate a 180 Pelamis wave farm. In other words, it will require 0.1 full-time crew per device is required. Reduction in personnel is possible with appropriate redesign of the units to make them easier to handle and improve their reliability. A major refit is required every 10-years for a commercial plant. In other words, assuming a 20-year life, one refit is required. Elements such as hydraulic rams are replaced during that period. In addition, some of the hull is repainted. Unlike the bi-annual maintenance activities, which can be carried out on a pier side, the 10-year refit requires de-ballasting the device and recovering it onto land. It will also need to be inspected at that point by ABS or a related agency.

(8) It is unclear at present what the failure rate of components and sub-systems are. Operational experience will be required with this specific technology to draw any conclusions. An allowance of 2% of Capital cost was included for a commercial project.

(9) 2% is a typical insurance rate for offshore projects using mature technology.

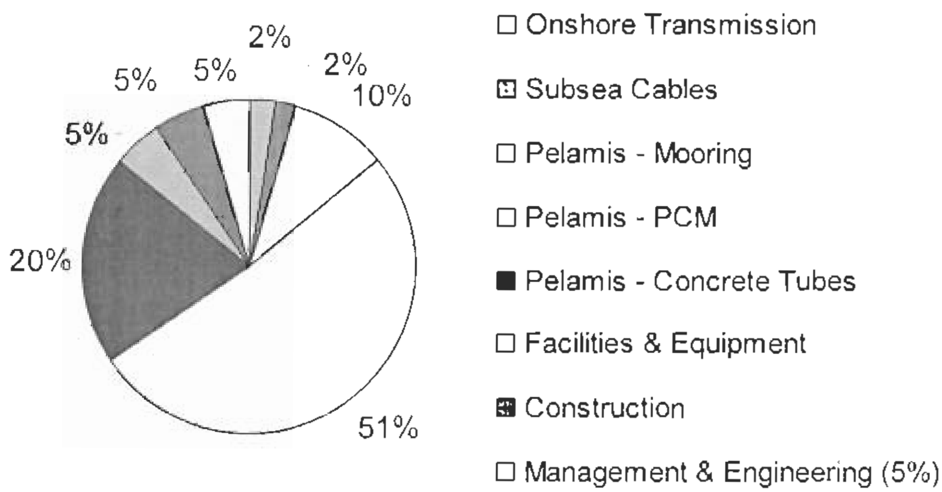


Figure 21: Installed Cost Breakdown for commercial scale plant

Cost uncertainties were estimated for each cost component and a Monte Carlo simulation was run to determine the likely capital uncertainty of the project. Figure 22 below shows the cost as a function of cost certainty as an S-curve. A steep slope indicates little uncertainty, while a flat slope indicates a large amount of uncertainty. The uncertainty for a large-scale project is bigger at this stage because it is unclear at present how well cost reductions could be achieved. These cost uncertainties were estimated for each cost center analyzed.

It shows that the cost accuracy is -24% to + 34%. This bottoms-up approach to uncertainty estimation compares to an initially estimated accuracy of -25% to +30% (from the top-down EPRI model described in Reference 2). The reason, why the projections to a commercial plant have a higher uncertainty, then for a single unit demonstration plant is because certain cost centers include cost reduction measures, which have a higher uncertainty.

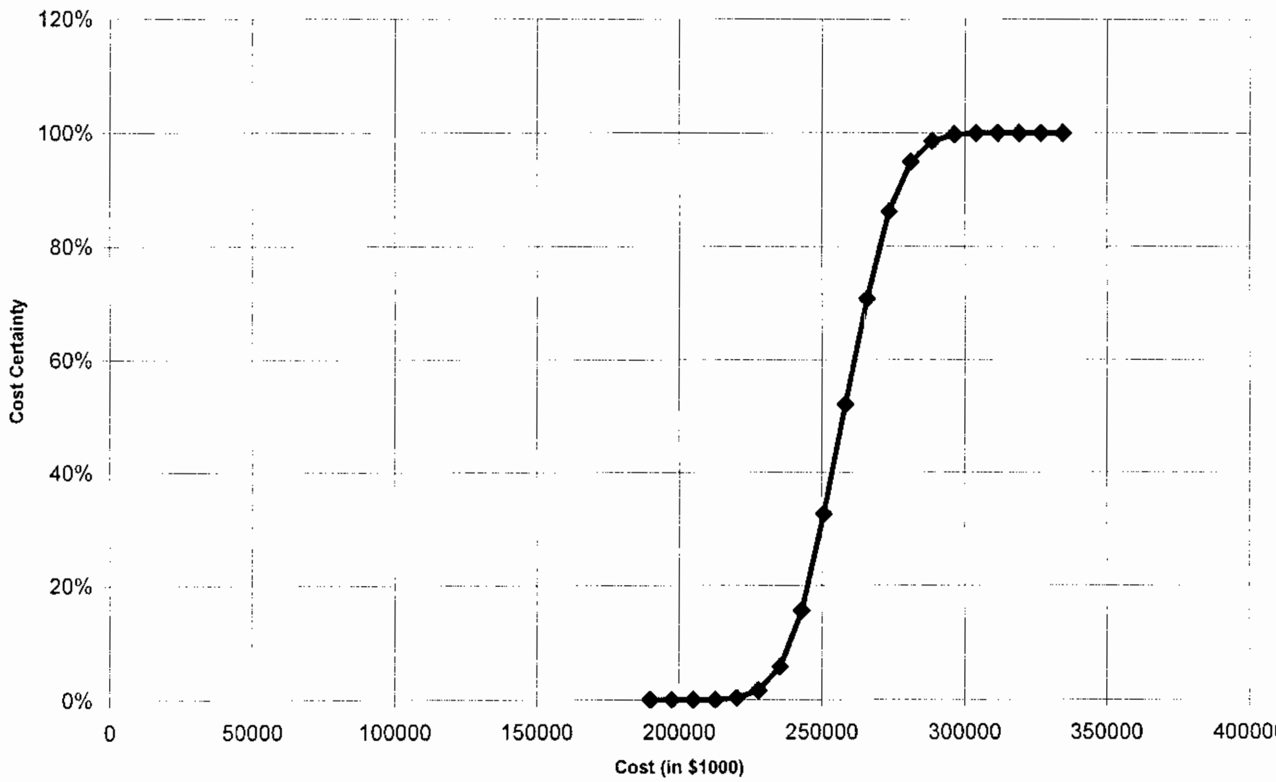


Figure 22: Installed Cost uncertainty S-curve

10. Cost of Electricity/Internal Rate of Return Assessment – Commercial Scale Plant

The Utility Generators (UG) cost of electricity (COE) and the Non-Utility Generator (NUG) internal rate of return (IRR) was assessed based on previously developed methodologies described in reference 3. In order to calculate the COE and IRR, underlying assumptions such as applicable tax rates, tax incentives, depreciation schedules and electricity price forecasts were identified based on the states applicable regulatory environment. Spreadsheet solutions were created for both UG and NUGs and the results are outlined in this section.

Table 8: UG and NUG Assumptions for the State of Massachusetts

	UG	NUG
Year Constant Dollar	2004	2004
Number of Devices	206	206
Annual Electrical Plant Output	300,000 MWh/yr	300,000 MWh/yr
Book Life	20 years	20 years
Taxation		
Federal Tax Rate	35%	35%
State Tax Rate (Massachusetts)	9.5%	9.5%
Composite Tax Rate	41.2%	41.2%
Financing		
Common Equity Financing Share	37.5%	30%
Preferred Equity Financing Share	10%	
Debt Financing Share	52.5%	70%
Nominal Common Equity Financing Rate	13%	17% (IRR hurdle rate)
Nominal Preferred Equity Financing Rate	10.5%	
Nominal Debt Financing Rate	7.5%	8%
Real Debt Financing Rate	4.5%	5%
Real Construction Financing Rate	4.5%	5%
Constant $ Discount Rate before Tax	7.52%	10.7%
Constant $ Discount Rate after Tax	6.47%	8.39%
Inflation rate	3%	3%
Renewable Credits & Incentives		
Federal Investment Tax Credit	10% of TPI	10% of TPI
Federal Production Tax Credit	1.8 cents/kWh (first 10 years)	1.8 cents/kWh (first 10 years)
State Investment Tax Credit	Installation Cost is Tax Deductible	Installation Cost is Tax Deductible

Renewable Energy Certificates (RECs)/		Through the MA RPS program, renewable energy generators receive revenue from selling RECs. Long-term projections for RECs are 2.5 cents/kWh.
Depreciation	MACR Accelerated	MACR Accelerated
Industrial Electricity Price (2002$) and	N/A	6.5 cents/kWh
Industrial Electricity Price Forecast (2002$)	N/A	8% decline from 2002 to 2008, stable through 2011 and then a constant escalation rate of 0.3%

The capital, O&M and 10-Year Refit cost and their uncertainty was previously estimated in section 8. Table 9 shows the translation of those numbers into a levelized cost of electricity (COE), using the methodology described in Reference 3.

Table 9 Major Cost elements and their Impacts on Cost of Electricity for Utility Generators (2004 constant year $) - Without RECs

Cost Element	Low	Best	High
Total Plant Investment	$202,103,000	$273,108,000	$355,818,000
Annual O&M Cost	$9,993,000	$12,356,000	$18,738,000
10-year Refit Cost (1 time cost)	$17,920,000	$26,532,000	$35,921,000
Fixed Charge rate (Nominal)	9.2	9.8	10.1
Cost of Electricity (c/kWh) (Nominal)	**10.0**	**13.4**	**19.1**
Fixed Charge rate (Real)	6.9	7.2	7.7
Cost of Electricity (c/kWh) (Real)	**8.4**	**11.1**	**16.0**

O&M costs have a significant effect on COE. It is a cost center with potential for significant improvements and is also the cost center with the most uncertainty at present because there is little experience with operating such wave farms which could be used to validate any of the numbers. Currently standard offshore oil & gas industry practices and rates were applied to derive appropriate operational costs. The offshore oil & gas industry is well known for it's high operational overhead and steep cost profiles. In order to reduce this cost center, the industry needs to learn by doing operating small wave farms. Cost reductions can be expected by improving the reliability of the deployed devices as well as improving the operational strategies.

In terms of definition, the Internal Rate of Return (IRR) is the discount rate that sets the present value of the net cash flows over the life of the plant to the equity investment at the commercial operating date. The net present value represents the present value of profit or returns using the time value of money. This calculation results from discounting the net cash flows at the 'discount rate."

Table 10 shows the translation of capital, O&M and 10-Year Refit cost and their uncertainty into an IRR using the methodology described in Reference 3.

Table 10: Major Cost elements and their impacts on Cost of Electricity for Non Utility Generators (2008 initial operation – 20 year life – current year $ = With and Without the REC)

Cost Element	Lowest Estimate	Best Estimate	High Estimate
Total Plant Investment (2004)	$209,027,000	$274,702,000	$365,977,000
Annual O&M Cost (2004$)	$9,993,000	$12,356,000	$18,738,000
10-year Refit Cost (2004$)	$17,920,000	$26,532,000	$35,921,000
With REC			
Internal Rate of Return	32.90%	7.6%	No IRR
Without REC			
Internal Rate of Return	No IRR	No IRR	No IRR

Table 10 shows that the first commercial plant owned by a NUG does have a positive internal rate of return with RECs but does not without RECs. Figure 23 and 25 shows the cumulative cash in current year dollars for the 20 year life of the project with and without RECs, respectively. Figure 24 and 26 shows the net cash flow in current year dollars for the life of the project with and without RECs, respectively. The economics analysis worksheets for these first UG and NUG commercial offshore wave power plant, both with and without RECs, are contained in Appendix B, C and D respectively

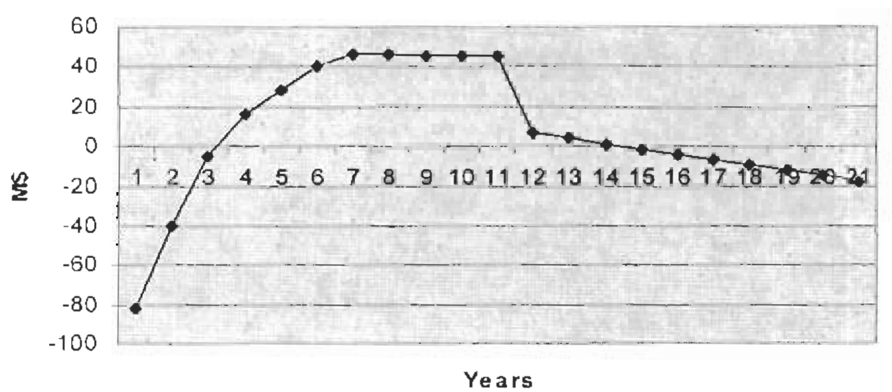


Figure 23: Cumulative Cash Flow Over 20 Year Project Life

Figure 24: Net and Cumulative Cash Flow Over 20 Year Project Life – With REC

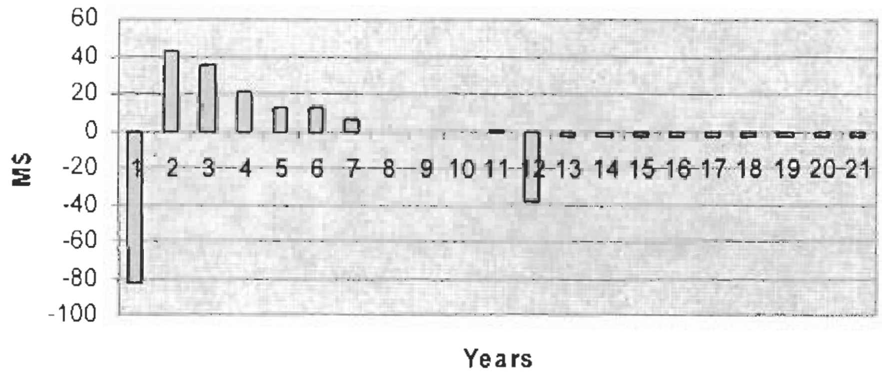


Figure 25: Cumulative Cash Flow Over 20 Year Project Life

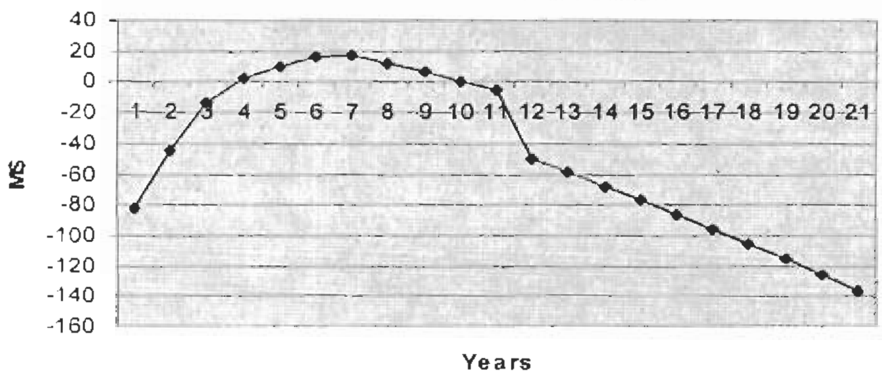
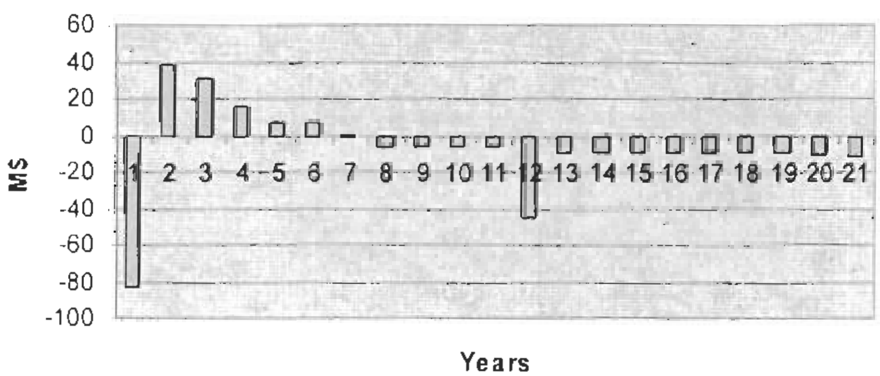


Figure 26: Net and Cumulative Cash Flow Over 20 Year Project Life – Without REC



11. Learning Curves

Operating in competitive markets makes enterprises do better. This fact is at the core of the learning curve phenomenon. Learning through production experience reduces prices for energy technologies and these reductions influence the dynamic competition among technologies. In addition, learning curves are used by Government policymakers to design measures to stimulate the production of new technologies to where they become commercially competitive.

In order to make available environmentally effective technologies (or technologies that have characteristics that are deemed to be of societal benefit), which are price competitive, governments support these technologies through funding of RD&D and through price subsidies or other forms of deployment policy. Crucial questions concern how much support a technology needs to become competitive and how much of this support has to come from government budgets. Learning curves make it possible to answer such questions because they provide a simple, quantitative relationship between price and the cumulative production or use of a technology. There is overwhelming empirical support for such a price-experience relationship forms all fields of industrial activity, including the production of equipment that transfers or uses energy.

As explained in reference 3, cost reduction goes hand-in-hand with cumulative production experience and follows logarithmic relations such that for each doubling of the cumulative production volume, there is a corresponding percentage drop in cost. An 82% learning curve is the curve to use for wave technology based on experience in the wind, photovoltaic and offshore oil and gas platform industry.

How a learning curve is used to show the deployment investment necessary to make a technology, such as wave energy, competitive with an existing technology, such as wind energy is illustrated in Figure 27. It does not, however, forecast when the technologies will break-even. The time of break-even depends on the deployment rates, which the decision-maker can influence through policy.

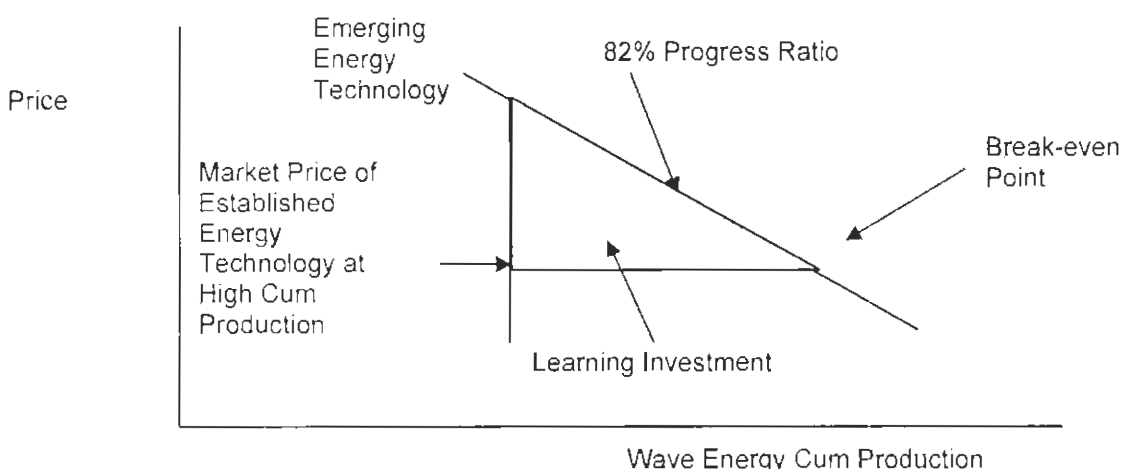


Figure 27: Learning Investment Required

12. Comparison with Commercial Scale Wind Power Plant

The cost (in 2004$) of a 750 kW pilot offshore wave energy power plant is described in Section 7 using the production experience gained by OPD from the build of the first prototype machine. The cost of a 103 MW commercial scale offshore wave energy power plant is described in Section 8 and was estimated as an extension of the costs of the pilot plant with cost reductions estimated for each major component individually, i.e., an overall learning curve was not used.

In this section, we apply learning cost reductions discussed in the previous section to wave power systems using the cost of the 103 MW commercial plant as the entry point to the learning curve process. The purpose is to enable the comparison of the cost of an offshore commercial scale wave farm versus the cost of an equivalent wind farm assuming the same level of production experience for both technologies.

For wind power plants and as reported by the National Wind Coordinating Council (NWCC), the installed capital cost has decreased from more than $2,500/kW in the early eighties to the 1997 range of $900/kW to $1,200/kW in 1997$[2]. The actual cost for a given installation depends on the size of the installation, the difficulty of construction, and the sophistication of the equipment and supporting infrastructure. "Total installed cumulative production volume topped 39,000 MW in 2003 and was about 10,000 MW in 1997"[3]. Based on the above numbers, the wind industry shows a progress ratio of 82%.

It turns out that the comparison of installed cost per unit of maximum or rated power as a function of cumulative installed capacity is not a meaningful comparison because of the effect of overrated or derated energy conversion devices. The 206 device Pelamis 1st commercial plant system has a rating of 103 MW, however, it could be overrated or derated by the manufacturer without much of a change in the annual energy production.

In order to make a meaningful comparison between wind and wave, a levelized comparison using COE numbers is required. In order to predict the cost of electricity for wave, a forecast of O&M cost is required. The following facts were considered in coming up with a conclusion:

- Offshore systems are more difficult to access then onshore systems and it is likely that it will always be more expensive to operate them then onshore systems
- Reliability will be similar to modern wind turbines Today (assuming the same cumulative production volume)
- Improvement in O&M costs can be made by paying greater attention to operational aspects in the design of the device

[2] "Wind Energy Costs" NWCC Wind Energy Series, Jan 1997, No 11

[3] "Wind Energy Industry Grows at Steady Pace, Adds Over 8,000 MW in 2003" American Wind Energy Association

Based on numerous discussions, we believe a reasonable assumption for mature wave power technology O&M cost is 50% higher then shore based wind at a cumulative installed capacity of 40,000 MW. Using the O&M cost quoted by WCC of 1.29 cents/kWh, wave would have 1.9 cents/kWh at the equivalent cumulative installed capacity. Based on this assumption, COE costing curves are presented as a function of installed capacity and compared to wind. Optimistic and pessimistic scenarios are presented based on the uncertainty in opening Total Plant Investment and O&M costs of the commercial plant outlined in earlier sections of this report.

The NWCC (footnote 3) also provides data on O&M costs (in 1997$) as follows:

Management, Insurance, Land use and Property Taxes	0.39 cents/kWh
Unscheduled Maintenance	0.68 cents/kWh
Preventative Maintenance	0.18 cents/kWh
Major Overhaul	0.04 cents/kWh
Total	**1.29 cents/kWh**

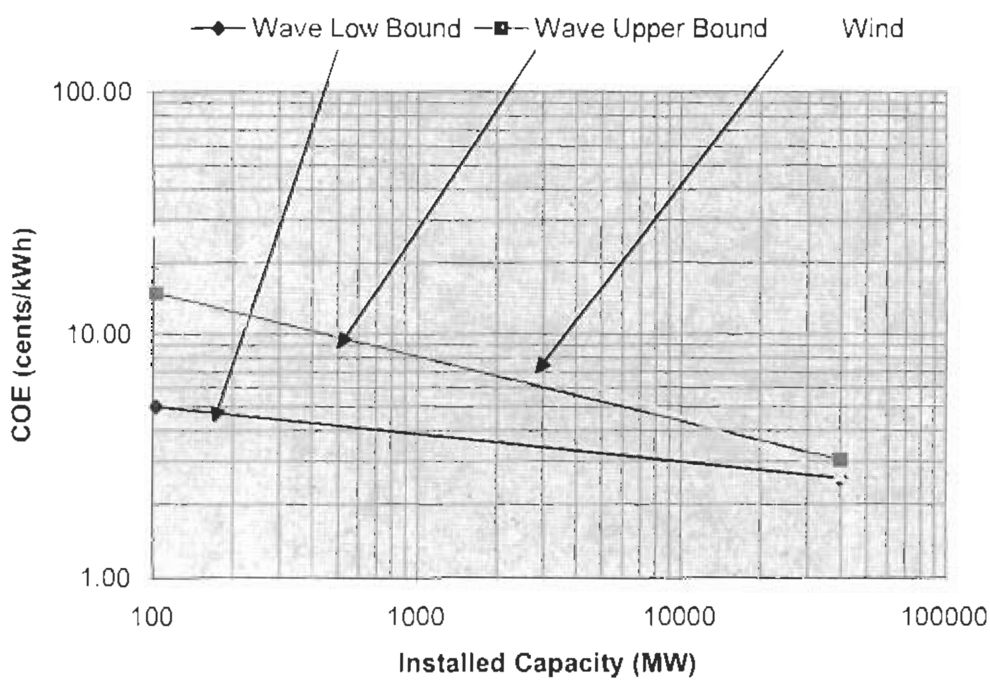


Figure 28: Levelized Wave Energy COE comparison to Wind - Without REC

The results in Figure 28 show that wave energy economics are favorable to wind energy economics at equivalent cumulative production level of less than 15,000 for the high wave cost estimate and to 40,000 MW for the low wave cost estimate. The reason that the slopes of the wave curves are different from the 82% learning curve slope of the wind curve is the lower learning slope of the wave energy O&M costs. The O&M component of COE for wave energy presents a challenge to the wave energy industry to drive down O&M costs to offer even more economic favorability for cumulative production volumes in excess of 40,000 MW..

The techno-economic assessment forecast made by the Project Team is that wave energy will become commercially competitive with the current 40,000 MW installed land-based wind technology at a cumulative production volume of about 40,000 MW. The size of a wave machine will be an order of magnitude smaller that an equivalent rated power wind machine and therefore is forecast to be less costly. The O&M costs for a remotely located offshore wave machine in a somewhat hostile environment will be higher than for a land based wind machine. The results of this study show that the lower cost machine only outweighs the additional O&M cost on a cost of electricity basis until a cumulative production volume of about 40,000 MW.

In addition to economics, there are other compelling arguments for investing in offshore wave energy. The first is that, with proper siting, converting ocean wave energy to electricity is believed to be one of the most environmentally benign ways of electricity generation. Second, offshore wave energy offers a way to avoid the 'Not In My Backyard' (NIMBY) issues that plague many energy infrastructure projects, from nuclear, coal and wind generation to transmission and distribution facilities. Because these devices have a very low profile and are located at a distance from the shore, they are generally not visible. Third, because wave energy is less intermittent that other renewable technologies such as solar and wind, it offers the possibility of being dispatchable and earning a capacity payment (this needs to be explored – see recommendations in Section 14)

The key characteristic of wave energy that promises to enable it to be one of the lowest cost renewable technologies is its high power density. Solar and wind power systems use a very diffuse solar and wind energy source. Processes in the ocean tend to concentrate the solar and wind energy into ocean waves making it easier and cheaper to harvest.

Lastly, since a diversity of energy sources is the bedrock of a robust electricity system, to overlook wave energy is inconsistent with our national needs and goals. Wave energy is an energy source that is too important to overlook.

13. Conclusions

Pilot Offshore Wave Power Plant

The upper arm of Cape Cod, Massachusetts is potentially a good location an offshore wave power plant. There are plenty of manufacturing facilities in Massachusetts, which could be used to build, assemble and deploy the wave power plant. Easements to land the power cable have not been identified, although they very likely exist. If such an easement can be identified, this would lower the cost for a pilot plant by about $500,000 and eliminate many cumbersome permitting issues.

The next steps forward towards implementing a wave energy pilot plant in Cape Cod Massachusetts are 1) Identify a local easement to land the power cable to shore, 2) to assess local public support and local infrastructure interest (marine engineering companies and fabricators), 3) to analyze site-specific environmental effects and 4) to develop a detailed implementation plan for a Phase II (Detailed Design, Environmental Impact Statement, Permitting , Construction Financing and Detailed Implementation Planning for Construction, and Operational Test and Evaluation)

Commercial Scale Offshore Wave Power Plants

The Cape Cod Massachusetts commercial scale power plant design, performance and cost results show that an offshore wave power plant, if learning investments are made to achieve the same degree of learning as today's wind technology, will provide favorable economics compared to wind technology in terms of both COE for a UG and in terms of IRR for a NUG.

As a new and emerging technology, offshore wave power has essentially no production experience and therefore its costs, uncertainties and risks are relatively high compared to existing commercially available technologies such as wind power with a cumulative production experience of about 40,000 MW installed. Private energy investors most probably will not select offshore wave technology when developing new generation because the cost, uncertainties and risk are too high at this point in time.

Government subsidy learning investments in wave energy technology, both RD&D and deployment are needed to ride down the experience curve to bring prices down to the break even point with wind energy technology. The market will then be transformed and offshore wave energy technology will be able to compete in the market place without further government subsidy (or at a subsidy equal to the wind energy subsidy). The learning effect irreversibly binds tomorrow's options to today's actions. Successful market implementation sets up a positive price-growth cycle; market growth provides learning and reduces price, which makes the product more attractive, supporting further growth which further reduces price. Conversely, a technology, which cannot enter the market because it is too expensive will be denied the learning necessary to overcome the cost barrier and therefore the technology will be locked-out from the market.

The learning-curve phenomenon presents the Government policy-maker with both risks and benefits. The risks involve the lock-out of potentially low-cost and environmentally benign technologies. The benefits lie in the creation of new technology options by exploiting the learning effect. However, there is also the risk that expected benefits will not materialize. Learning opportunities in the market and learning investments are both scarce resources. Policy decisions to support market learning for a technology must therefore be based on assessments of the future markets for the technology and its value to the energy system

In a market where price reflects all present and future externalities, we expect the integrated action of the actors to produce an efficient balance of the technology options. The risk of climate change and the social and health costs of some electricity generation options, however, pose an externality, which might be very substantial and costly to internalize through price alone. Intervening in the market to support a climate-friendly technology that may otherwise risk lock-out is a legitimate way for the Government policy-maker to manage the externality.

We conclude that offshore wave technology requires a Federal Government learning investment subsidy in order for it to be able to compete with available electricity generation technologies. All electricity generation technologies commercially available today have received Federal Government subsidies in the past. Subsidy of beneficial societal energy options has traditionally not been handled by State Governments. Wave energy technology will not be the first electricity generation technology to reach the commercial market place without Federal Government subsidy. Governments in Europe and the Government of Australia are subsidizing off shore wave energy. Should the U.S. Government drive the cumulative volume up and the price down by funding offshore wave energy technology RD&D and providing deployment subsidies?

Techno-Economic Challenges

Offshore wave energy electricity generation is a new and emerging technology application. The first time electricity was provided to the electrical grid from an offshore wave power plant occurred in early August 2004 by the full scale preproduction OPD Pelamis prototype in the UK. Many important questions about the application of offshore wave energy to electricity generation remain to be answered. Some of the key issues which remain to be addressed are:

- There is not a single wave power technology. Rather we are talking about a wide range of wave power technologies and power conversion machines which are currently under development. It is unclear at present what type of technology will yield optimal economics.

- It is also unclear at present at which size these technologies will yield optimal economics. Wave Power devices are typically tuned to prevailing wave conditions. As such optimization is largely driven by the wave climate at the deployment site. Very few existing designs have been optimized for the US wave climate. Wind turbines for example have grown in size from less then 100kW per unit to over 3MW in order to drive down cost.

- Given a certain device type and rating, what capacity factor is optimal for a given site? Ocean waves have a vast range of power levels and optimal power ratings can be only determined using sophisticated techno-economic optimization procedures.

- Will the low intermittency (relative to solar and wind) and the better predictability of wave energy (relative to solar and wind) earn capacity payments for its ability to be dispatched for electricity generation?

- Will the installed cost of wave energy conversion devices realize their potential of being much less expensive per COE than solar or wind (because a wave machine is converting a much more concentrated form of energy than a solar or wind machine and is therefore smaller in size)?

- Will the O&M cost of wave energy conversion devices be as high as predicted in this study and remain much higher than the O&M cost of solar or wind (because of the more remote and harsher environment in which it operates and must be maintained)?

- Will the performance, reliability and cost projections be realized in practice once wave energy devices are deployed and tested?

14. Recommendations

Pilot Offshore Wave Power Plant

E2I EPRI makes the following specific recommendations to the Massachusetts State Electricity Stakeholders:

1. Encourage the ongoing R&D at universities such as University of Massachusetts , MIT and Woods Hole Oceanographic Institute to include technology cost reduction, improvement in efficiency and reliability, identification of sites, interconnection with the utility grid and study of impacts of the technology on marine life and the shoreline

2. Coordinate efforts to attract a pilot feasibility demonstration wave energy system project to the Massachusetts coast

3. Now that the Cape Cod Massachusetts pilot demonstration plant project definition study is complete, proceed to the next steps of assessing local public support, local infrastructure interest (marine engineering companies and fabricators), analyzing site-specific environmental effects and developing a detailed implantation plan for a Phase II (Detailed Design, Environmental Impact Statement, Permitting, Construction Financing and Preliminary Implementation Planning for Construction, and Operational Test and Evaluation)

   If this recommendation cannot be implemented at this time (due to lack of funding or other reason), E2I EPRI Global recommends that the momentum built up in Phase 1 be sustained in order to bridge the gap until Phase II can start by funding what we will call Phase 1.5 with the following tasks

   a. Tracking potential funding sources
   b. Tracking wave energy test and evaluation projects overseas (primarily in the UK, Portugal and Australia) and in Hawaii
   c. Tracking status and efforts of the permitting process for new wave projects
   d. Track and assess new wave energy devices
   e. Establish a working group for the establishment of a permanent wave energy testing facility in the U.S.
   f. Develop Communications Plan and Messaging Kit for State Champions

4. Build collaboration with other states with interest and common goals in offshore wave energy.

Commercial Scale Offshore Wave Power Plants

E2I EPRI makes the following specific recommendations to the Massachusetts State Electricity Stakeholders relative to a Cape Cod Massachusetts commercial scale offshore wave power plant

1. Understand the implications of Government subsidy of wave energy technology, the use of learning curves to assist in subsidy decision-making and the potential for lock-out of the technology if the Government decides to withhold subsidy from this technology.

If after gaining this understanding, you advocate Government subsidy of offshore wave energy technology:

1. Encourage Department of Energy leaders to initiate an ocean energy RD&D program. Specifically, we recommend that the Federal government develop a wave energy technology roadmap and RD&D plan to fill the known technology gaps and then plan a RD&D program with levels of funding and timeframes.

2. Encourage DOE leaders to participate in the development of offshore wave energy technology (standards, national offshore wave test center, etc).

Technology Application

In order to stimulate the growth of ocean energy technology in the United States and to address and answer the techno-economic challenges listed in Section 13, we recommend the following take place:

- Federal recognition of ocean energy as a renewable resource, and public recognition by Congress that expansion of an ocean energy industry in the U.S. is a vital national priority.

- Creation of an ocean energy program within the Department of Energy's Energy Efficiency and Renewable Energy division.

- DOE works with the government of Canada on an integrated bi-lateral ocean energy strategy.

- The process for licensing, leasing, and permitting renewable energy facilities in U.S. waters must be streamlined

- Provision of production tax credits, renewable energy credits, and other incentives to spur private investment in Ocean Energy technologies and projects.
- Provision of adequate federal funding for ocean energy R&D and demonstration projects.
- Ensuring that the public receives a fair return from the use of ocean energy resources and that development rights are allocated through an open, transparent process that takes into account state, local, and public concerns.

15. References

1. E2I EPRI WP US 005 "Methodology for Conceptual Level Design of Offshore Wave Power Plants" Mirko Previsic and Roger Bedard, June 9, 2004

2. E2I EPRI WP US 001 "Guidelines for Preliminary Estimation of Power Production by Offshore Wave Energy Conversion Devices" George Hagerman and Roger Bedard, December 22, 2003

3. E2I EPRI WP US 003 "Economic Assessment Methodology for Offshore Wave Energy Power Plants" Rev 2. Mirko Previsic and Roger Bedard, August 16, 2004

4. E2I EPRI WP US 004 "E2I EPRI Assessment Offshore Wave Energy Devices" Rev 1, Mirko Previsic, Roger Bedard and George Hagerman, June 16, 2004

5. "Pelamis WEC – Main Body Structural Design and Material Selection", Department of Trade and Industry (DTI)

6. "Pelamis WEC – Conclusion of Primary R&D", Department of Trade and Industry (DTI)

Appendix A – Monthly Wave Energy Resource Scatter Diagrams

Table A-1: Scatter diagram January

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	4
5.75	6.25	6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
5.25	5.75	5.5	0	0	0	0	0	0	3	1	1	0	0	0	0	0	0	0	0	5
4.75	5.25	5	0	0	0	0	0	0	5	2	2	0	0	0	0	0	0	0	0	9
4.25	4.75	4.5	0	0	0	0	1	4	4	3	6	0	0	0	0	0	0	0	0	18
3.75	4.25	4	0	0	0	1	5	11	5	4	4	1	0	0	0	0	0	0	0	31
3.25	3.75	3.5	0	0	0	4	16	14	2	4	6	0	0	0	0	0	0	0	0	47
2.75	3.25	3	0	0	0	14	23	32	4	10	6	1	0	0	0	0	0	0	0	91
2.25	2.75	2.5	0	0	2	39	22	16	11	3	5	0	0	0	0	0	0	0	0	98
1.75	2.25	2	0	0	30	54	28	20	12	12	16	0	0	0	0	0	0	0	0	174
1.25	1.75	1.5	0	6	25	33	24	15	8	6	11	0	0	0	0	0	0	0	0	130
0.75	1.25	1	4	11	17	30	16	22	20	7	4	0	0	0	0	0	0	0	0	133
0.25	0.75	0.5	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		744	5	17	75	176	137	136	75	57	64	2	0	0	0	0	0	0	0	744

Table A-2: Scatter Diagram February

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
5.75	6.25	6	0	0	0	0	0	0	1	5	1	0	0	0	0	0	0	0	0	7
5.25	5.75	5.5	0	0	0	0	1	0	1	3	3	0	0	0	0	0	0	0	0	8
4.75	5.25	5	0	0	0	0	0	1	1	1	3	1	4	0	0	0	0	0	0	11
4.25	4.75	4.5	0	0	0	0	0	1	1	0	2	0	0	1	0	0	0	0	0	5
3.75	4.25	4	0	0	0	0	0	5	3	2	4	0	0	0	0	0	0	0	0	14
3.25	3.75	3.5	0	0	0	3	9	15	6	5	12	2	0	0	0	0	0	0	0	53
2.75	3.25	3	0	0	0	15	18	20	1	3	4	4	2	0	0	0	0	0	0	68
2.25	2.75	2.5	0	0	4	28	25	33	2	8	13	1	1	0	0	0	0	0	0	116
1.75	2.25	2	0	0	16	52	31	15	9	9	8	3	2	0	0	0	0	0	0	146
1.25	1.75	1.5	0	5	15	25	29	4	3	8	17	0	0	0	0	0	0	0	0	107
0.75	1.25	1	2	16	11	13	16	15	15	10	3	0	0	0	0	0	0	0	0	102
0.25	0.75	0.5	3	4	2	5	1	6	5	4	3	0	0	0	0	0	0	0	0	33
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		672	5	25	49	141	131	116	49	61	74	11	9	1	0	0	0	0	0	672

Table A-3: Scatter Diagram March

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.75	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.75	5.25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.25	4.75	4.5	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
3.75	4.25	4	0	0	0	0	3	2	2	0	5	2	0	0	0	0	0	0	0	14
3.25	3.75	3.5	0	0	0	1	3	16	2	2	5	4	0	0	0	0	0	0	0	33
2.75	3.25	3	0	0	0	1	6	16	11	7	2	4	0	0	0	0	0	0	0	47
2.25	2.75	2.5	0	0	1	13	10	24	21	16	10	0	0	0	0	0	0	0	0	95
1.75	2.25	2	0	0	11	39	17	30	13	14	22	2	0	0	0	0	0	0	0	148
1.25	1.75	1.5	0	10	32	22	17	26	4	7	9	1	0	0	0	0	0	0	0	128
0.75	1.25	1	4	28	27	27	32	22	7	7	1	0	1	0	0	0	0	0	0	156
0.25	0.75	0.5	3	10	17	8	21	34	12	4	1	0	0	0	0	0	0	0	0	110
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		733	7	48	88	111	110	171	72	57	55	13	1	0	0	0	0	0	0	733

Table A-4: Scatter Diagram April

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.76	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.75	5.25	5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4.25	4.75	4.5	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	3
3.75	4.25	4	0	0	0	0	1	2	3	4	2	1	0	0	0	0	0	0	0	13
3.25	3.75	3.5	0	0	0	1	4	10	8	5	3	1	2	0	0	0	0	0	0	34
2.75	3.25	3	0	0	0	2	10	17	15	12	3	3	0	0	0	0	0	0	0	63
2.25	2.75	2.5	0	0	0	8	12	19	35	43	20	3	1	0	0	0	0	0	0	143
1.75	2.25	2	0	0	2	24	27	22	18	21	24	1	0	0	0	0	0	0	0	141
1.25	1.75	1.5	0	3	23	28	21	26	17	24	17	0	0	0	0	0	0	0	0	161
0.75	1.25	1	0	3	15	14	15	35	32	26	7	0	0	0	0	0	0	0	0	149
0.25	0.75	0.5	0	0	0	0	1	8	2	1	1	0	0	0	0	0	0	0	0	13
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		720	0	6	40	78	92	143	133	138	78	9	3	0	0	0	0	0	0	720

Table A-5: Scatter Diagram May

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.75	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.75	5.25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.25	4.75	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.75	4.25	4	0	0	0	0	0	2	2	1	2	0	0	0	0	0	0	0	0	7
3.25	3.75	3.5	0	0	0	0	0	3	0	0	3	1	0	0	0	0	0	0	0	7
2.75	3.25	3	0	0	0	0	2	3	3	1	2	0	0	0	0	0	0	0	0	12
2.25	2.75	2.5	0	0	0	3	6	14	3	5	4	0	0	0	0	0	0	0	0	36
1.75	2.25	2	0	0	4	12	11	34	11	2	3	0	0	0	0	0	0	0	0	76
1.25	1.75	1.5	0	1	14	28	29	74	25	26	9	2	0	0	0	0	0	0	0	209
0.75	1.25	1	0	22	26	32	57	88	43	16	7	1	0	0	0	0	0	0	0	292
0.25	0.75	0.5	1	1	4	9	18	53	16	3	0	0	0	0	0	0	0	0	0	105
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		744	1	24	48	84	123	270	103	55	32	4	0	0	0	0	0	0	0	744

Table A-6: Scatter Diagram June

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.75	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.75	5.25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.25	4.75	4.5	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2
3.75	4.25	4	0	0	0	0	1	0	1	0	3	1	0	0	0	0	0	0	0	6
3.25	3.75	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.75	3.25	3	0	0	0	0	2	1	1	5	4	0	0	0	0	0	0	0	0	13
2.25	2.75	2.5	0	0	0	2	0	2	0	1	0	0	0	0	0	0	0	0	0	5
1.75	2.25	2	0	0	0	1	5	6	5	0	2	0	0	0	0	0	0	0	0	19
1.25	1.75	1.5	0	0	9	16	45	46	26	9	8	0	0	0	0	0	0	0	0	159
0.75	1.25	1	1	12	13	28	54	121	57	21	7	0	0	0	0	0	0	0	0	314
0.25	0.75	0.5	0	9	11	41	59	67	13	2	0	0	0	0	0	0	0	0	0	202
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		720	1	21	33	88	166	244	103	38	25	1	0	0	0	0	0	0	0	720

Table A-7: Scatter Diagram July

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.75	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.75	5.25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.25	4.75	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.75	4.25	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.25	3.75	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.75	3.25	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.25	2.75	2.5	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	6
1.75	2.25	2	0	0	0	2	13	31	14	1	0	0	0	0	0	0	0	0	0	61
1.25	1.75	1.5	0	0	0	27	42	34	9	0	0	0	0	0	0	0	0	0	0	112
0.75	1.25	1	0	6	12	84	142	125	15	5	2	0	0	0	0	0	0	0	0	392
0.25	0.75	0.5	0	2	3	21	64	61	10	8	3	0	0	0	0	0	0	0	0	172
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		744	0	8	15	134	262	258	48	14	5	0	0	0	0	0	0	0	0	744

Table A-8: Scatter Diagram August

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.75	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.75	5.25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.25	4.75	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.75	4.25	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.25	3.75	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.75	3.25	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.25	2.75	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.75	2.25	2	0	0	0	3	10	7	1	0	0	0	0	0	0	0	0	0	0	21
1.25	1.75	1.5	0	1	3	29	46	52	1	0	0	0	0	0	0	0	0	0	0	132
0.75	1.25	1	1	6	45	113	85	58	0	9	8	0	0	0	0	0	0	0	0	325
0.25	0.75	0.5	4	11	48	68	61	54	13	0	6	0	0	0	0	0	0	0	0	265
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		744	5	18	96	213	202	171	15	9	14	0	0	0	0	0	0	0	0	744

Table A-9: Scatter Diagram September

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.75	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.75	5.25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.25	4.75	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.75	4.25	4	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
3.25	3.75	3.5	0	0	0	0	0	0	0	0	0	1	4	7	0	0	0	0	0	12
2.75	3.25	3	0	0	0	0	0	0	0	1	8	3	4	8	5	3	0	0	0	32
2.25	2.75	2.5	0	0	0	0	0	1	1	0	7	11	20	16	4	1	0	0	0	62
1.75	2.25	2	0	0	1	5	6	7	5	8	16	18	11	23	9	2	1	0	0	114
1.25	1.75	1.5	0	2	12	18	23	25	9	6	35	21	22	13	2	1	0	0	0	192
0.75	1.25	1	0	14	28	15	17	43	32	25	18	15	2	1	2	0	0	0	0	214
0.25	0.75	0.5	2	4	3	1	7	10	15	19	11	1	0	8	9	1	0	0	0	92
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		720	2	20	45	40	54	86	63	60	96	71	64	79	31	8	1	0	0	720

Table A-10: Scatter Diagram October

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.75	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.75	5.25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.25	4.75	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.75	4.25	4	0	0	0	0	0	1	2	4	2	0	0	0	0	0	0	0	0	9
3.25	3.75	3.5	0	0	0	0	0	2	2	4	1	0	0	0	0	0	0	0	0	9
2.75	3.25	3	0	0	0	0	0	11	5	7	5	0	0	0	0	0	0	0	0	28
2.25	2.75	2.5	0	0	4	5	9	27	12	14	0	0	0	0	0	0	0	0	0	72
1.75	2.25	2	0	1	10	30	25	16	16	20	7	4	5	0	0	0	0	0	0	136
1.25	1.75	1.5	0	2	27	24	16	28	11	12	12	11	13	9	2	0	0	0	0	169
0.75	1.25	1	6	15	44	38	28	36	31	19	26	3	4	6	0	0	0	0	0	257
0.25	0.75	0.5	0	4	3	5	7	1	7	23	12	0	0	0	0	0	0	0	0	63
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		744	6	22	88	102	86	124	87	104	66	18	22	15	2	0	0	0	0	744

Table A-11: Scatter Diagram November

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.75	7.25	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.25	6.75	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.75	6.25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.25	5.75	5.5	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	4
4.75	5.25	5	0	0	0	0	1	1	0	0	4	1	0	0	0	0	0	0	0	7
4.25	4.75	4.5	0	0	0	0	7	0	1	1	5	2	0	0	0	0	0	0	0	16
3.75	4.25	4	0	0	0	2	13	2	2	5	6	0	0	0	0	0	0	0	0	30
3.25	3.75	3.5	0	0	0	2	7	6	5	3	2	0	0	0	0	0	0	0	0	25
2.75	3.25	3	0	0	0	6	8	15	4	1	7	1	0	0	0	0	0	0	0	42
2.25	2.75	2.5	0	0	1	15	28	17	1	6	9	2	0	0	0	0	0	0	0	79
1.75	2.25	2	0	0	6	13	13	12	7	8	14	6	1	0	0	0	0	0	0	80
1.25	1.75	1.5	0	3	6	17	24	8	25	26	7	5	1	0	0	0	0	0	0	122
0.75	1.25	1	1	17	19	28	35	38	20	28	20	0	0	0	0	0	0	0	0	206
0.25	0.75	0.5	16	18	21	17	2	4	15	9	0	1	0	0	0	0	0	0	0	103
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		714	17	38	53	100	138	103	80	88	75	19	3	0	0	0	0	0	0	714

Table A-12: Scatter Diagram December

		Upper Tp:	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	20.5	
		Lower Tp:	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	19.5	Total
Hs and Tp bin boundaries			Tp (sec)																	
Lower Hs	Upper Hs	Hs (m)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	hours
9.75	10.25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.25	9.75	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.75	9.25	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.25	8.75	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.75	8.25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.25	7.75	7.5	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
6.75	7.25	7	0	0	0	0	0	0	0	1	6	2	0	0	0	0	0	0	0	9
6.25	6.75	6.5	0	0	0	0	0	0	0	3	1	4	0	0	0	0	0	0	0	8
5.75	6.25	6	0	0	0	0	0	0	1	4	3	0	5	0	0	0	0	0	0	13
5.25	5.75	5.5	0	0	0	0	0	0	3	1	10	8	2	0	0	0	0	0	0	24
4.75	5.25	5	0	0	0	0	0	2	2	3	9	2	2	0	0	0	0	0	0	20
4.25	4.75	4.5	0	0	0	0	0	5	4	4	11	4	3	0	0	0	0	0	0	32
3.75	4.25	4	0	0	0	0	0	6	4	7	6	0	0	0	0	0	0	0	0	23
3.25	3.75	3.5	0	0	0	0	6	8	10	7	9	2	0	0	0	0	0	0	0	43
2.75	3.25	3	0	0	0	7	11	17	8	5	13	1	0	0	0	0	0	0	0	63
2.25	2.75	2.5	0	0	4	31	15	33	10	5	4	0	0	0	0	0	0	0	0	102
1.75	2.25	2	0	0	11	39	20	30	23	7	7	0	0	0	0	0	0	0	0	137
1.25	1.75	1.5	0	2	16	33	23	25	15	12	12	0	0	0	0	0	0	0	0	139
0.75	1.25	1	0	14	11	23	13	18	5	16	12	1	0	1	0	0	0	0	0	116
0.25	0.75	0.5	1	2	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	11
0	0.25	0.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		744	1	18	47	136	90	145	87	76	107	24	12	1	0	0	0	0	0	744

Appendix B- Commercial Plant Cost Economics Worksheet – Regulated Utility

INSTRUCTIONS

Indicates Input Cell (either input or use default values)

Indicates a Calculated Cell (do not input any values)

Sheet 1. TPC/TPI (Total Plant Cost/Total Plant Investment)

a) Enter Component Unit Cost and No. of Units per System
b) Worksheet sums component costs to get TPC
c) Adds the value of the construction loan payments to get TPI

Sheet 2. AO&M (Annual operation and Maintenance Cost)

a) Enter Labor Hrs and Cost by O&M Type)
b) Enter Parts and Supplies Cost by O&M Type)
c) Worksheet Calculates Total Annual O&M Cost

Sheet 3. O&R (Overhaul and Replacement Cost)

a) Enter Year of Cost and O&R Cost per Item
b) Worksheets calculates the present value of the O&R costs

Sheet 4. Assumptions (Financial)

a) Enter project and financial assumptions or leave default values

Sheet 5. NPV (Net Present Value)

A Gross Book Value = TPI
B Annual Book Depreciation = Gross Book Value/Book Life
C Cumulative Depreciation
D MACRS 5 Year Depreciation Tax Schedule Assumption
E Deferred Taxes = (Gross Book Value X MACRS Rate - Annual Book Depreciation) X Debt Financing Rate
F Net Book Value = Previous Year Net Book Value - Annual Book Depreciation - Deferred Tax for that Year

Sheet 6. CRR (Capital Revenue Requirements)

A Net Book Value for Column F of NPV Worksheet
B Common Equity = Net Book X Common Equity Financing Share X Common Equity Financing Rate
C Preferred Equity = Net Book X Preferred Equity Financing Share X Preferred Equity Financing Rate
D Debt = Net Book X Debt Financing Share X Debt Financing Rate
E Annual Book Depreciation = Gross Book Value/Book Life
F Income Taxes = (Return on Common Equity + Return of Preferred Equity - Book Depreciation + Deferred Taxes) X (Comp Tax Rate/(1-Comp Tax Rate))
G Property Taxes and Insurance Expense =
H Calculates Investment and Production Tax Credit Revenues
I Capital Revenue Req'ts = Sum of Columns B through G

Sheet 7. FCR (Fixed Charge Rate)

A Nominal Rates Capital Revenue Req'ts from Columnn H of Previous Worksheet
B Nominal Rate Present Worth Factor = 1 / (1 + After Tax Discount Rate)
C Nominal Rate Product of Columns A and B = A * B
D Real Rates Capital Revenue Req'ts from Columnn H of Previous Worksheet
E Real Rates Present Worth Factor = 1 / (1 + After Tax Discount Rate - Inflation Rate)
F Real Rates Product of Columns A and B = A * B

Sheet 8. Calculates COE (Cost of Electricity)

COE = ((TPI * FCR) + AO&M + LO&R) / AEP

In other words...The Cost of Electricity =

The Sum of the Levelized Plant Investment + Annual O&M Cost + Levelized Overhaul and Replacement Cost Divided by the Annual Electric Energy Consumption

TOTAL PLANT COST (TPC) - 2004$

TPC Component	Unit	Unit Cost	Total Cost (2004$)	
Procurement				
Onshore Trans & Grid I/C	1	$6,000,000	$6,000,000	
Subsea Cables	1	$4,886,000	$4,886,000	
Mooring	206	$116,941	$24,089,846	
Power Conversion Modules (set of 3) at $	206	$623,961	$128,535,966	
Concrete Structure Sections	206	$244,800	$50,428,800	
Facilities	1	$12,000,000	$12,000,000	
Installation	1	$12,170,000	$12,170,000	
Construction Management	1	$11,297,000	$11,297,000	
TOTAL			$249,407,612	

TOTAL PLANT INVESTMENT (TPI) - 2004 $

End of Year	Total Cash Expended TPC (2004$)	Before Tax Construction Loan Cost at Debt Financing Rate	2004 Value of Construction Loan Payments	TOTAL PLANT INVESTMENT 2004$
2006	$124,703,806	$9,352,785	$8,444,953	$133,148,759
2007	$124,703,806	$18,705,571	$15,250,479	$139,954,285
Total	$249,407,612	$28,058,356	$23,695,432	$273,103,044

ANNUAL OPERATING AND MAINTENANCE COST (AO&M) - 2004$

Costs	Yrly Cost	Amount	
LABOR	$2,516,000	$2,516,000	
PARTS AND SUPPLIES (2%)	$4,920,000	$4,920,000	
INSURANCE (2%)	$4,920,000	$4,920,000	
Total		$12,356,000	

OVERHAUL AND REPLACEMENT COST (OAR) - 2004$

O&R Costs	Year of Cost	Cost in 2004$	
10 Year Retrofit			
Operation	10	$10,570,000	
Parts	10	$15,962,000	
Total		$26,532,000	

FINANCIAL ASSUMPTIONS

(default assumptions in pink background - without line numbers are calculated values)

1	Rated Plant Capacity ©	103	MW
2	Annual Electric Energy Production (AEP)	300,000	MWeh/yr
	Therefore, Capacity Factor	33.23	%
3	Year Constant Dollars	2004	Year
4	Federal Tax Rate	35	%
5	State	Mass	
6	State Tax Rate	9.5	%
	Composite Tax Rate (t)	0.41175	
	t/(1-t)	0.7000	
7	Book Life	20	Years
8	Construction Financing Rate	7.5	
9	Common Equity Financing Share	52	%
10	Preferred Equity Financing Share	13	%
11	Debt Financing Share	35	%
12	Common Equity Financing Rate	13	%
13	Preferred Equity Financing Rate	10.5	%
14	Debt Financing Rate	7.5	%
	Nominal Discount Rate Before-Tax	10.75	%
	Nominal Discount Rate After-Tax	9.67	%
15	Inflation Rate = 3%	3	%
	Real Discount Rate Before-Tax	7.52	%
	Real Discount Rate After-Tax	6.47	%
16	Federal Investment Tax Credit	10	% 1st year only
17	Federal Production Tax Credit	0.018	$/kWh for 1st 10 years
18	State Investment Tax Credit	0	% of TPI up to $2.5M
19	State Investment Tax CreditLimit		Credit-1st year only> $10M plant
20	Renewable Energy Certificate	0.025	$/kWh
21	State Tax Depreciation	$12,170,000	Installation Cost

NET PRESENT VALUE (NPV) - 2004 $

TPI = $273,103,044

Year End	Gross Book Value	Book Depreciation Annual	Book Depreciation Accumulated	Renewable Resource MACRS Tax Depreciation Schedule	Deferred Taxes	Net Book Value
	A	B	C	D	E	F
2007	**273,103,044**					**273,103,044**
2008	273,103,044	13,655,152	13,655,152	0.2000	16,867,527	242,580,365
2009	273,103,044	13,655,152	27,310,304	0.3200	30,361,548	198,563,665
2010	273,103,044	13,655,152	40,965,457	0.1920	15,967,925	168,940,587
2011	273,103,044	13,655,152	54,620,609	0.1152	7,331,752	147,953,684
2012	273,103,044	13,655,152	68,275,761	0.1152	7,331,752	126,966,780
2013	273,103,044	13,655,152	81,930,913	0.0576	854,621	112,457,006
2014	273,103,044	13,655,152	95,586,066	0.0000	-5,622,509	104,424,363
2015	273,103,044	13,655,152	109,241,218	0.0000	-5,622,509	96,391,720
2016	273,103,044	13,655,152	122,896,370	0.0000	-5,622,509	88,359,076
2017	273,103,044	13,655,152	136,551,522	0.0000	-5,622,509	80,326,433
2018	273,103,044	13,655,152	150,206,674	0.0000	-5,622,509	72,293,790
2019	273,103,044	13,655,152	163,861,827	0.0000	-5,622,509	64,261,146
2020	273,103,044	13,655,152	177,516,979	0.0000	-5,622,509	56,228,503
2021	273,103,044	13,655,152	191,172,131	0.0000	-5,622,509	48,195,860
2022	273,103,044	13,655,152	204,827,283	0.0000	-5,622,509	40,163,216
2023	273,103,044	13,655,152	218,482,436	0.0000	-5,622,509	32,130,573
2024	273,103,044	13,655,152	232,137,588	0.0000	-5,622,509	24,097,930
2025	273,103,044	13,655,152	245,792,740	0.0000	-5,622,509	16,065,287
2026	273,103,044	13,655,152	259,447,892	0.0000	-5,622,509	8,032,643
2027	273,103,044	13,655,152	273,103,044	0.0000	-5,622,509	0

CAPITAL REVENUE REQUIREMENTS

TPI = $273,103,044

End of Year	Net Book	Returns to Equity Common	Returns to Equity Pref	Interest on Debt	Book Dep	Income Tax on Equity Return	ITC and PTC	Capital Revenue Req'ts
	A	B	C	D	E	F	H	I
2008	242,580,365	16,388,433	3,311,222	6,367,735	13,655,152	12,626,846	47,710,304	4,649,083
2009	198,563,665	13,422,904	2,710,394	5,212,296	13,655,152	28,896,030	20,400,000	43,496,777
2010	168,940,587	11,420,384	2,306,039	4,434,690	13,655,152	17,680,687	20,400,000	29,096,952
2011	147,953,684	10,001,869	2,019,568	3,883,784	13,655,152	10,827,786	20,400,000	19,987,959
2012	126,966,780	8,582,954	1,733,097	3,332,878	13,655,152	10,019,839	20,400,000	16,923,920
2013	112,457,006	7,602,094	1,535,038	2,951,996	13,655,152	4,927,531	20,400,000	10,271,811
2014	104,424,363	7,059,087	1,425,393	2,741,140	13,655,152	84,577	20,400,000	4,565,348
2015	96,391,720	6,516,080	1,315,747	2,530,283	13,655,152	-224,661	20,400,000	3,392,601
2016	88,359,076	5,973,074	1,206,101	2,319,426	13,655,152	-533,899	20,400,000	2,219,854
2017	80,326,433	5,430,067	1,096,456	2,108,569	13,655,152	-843,137	20,400,000	1,047,106
2018	72,293,790	4,887,060	986,810	1,897,712	13,655,152	-1,152,375	7,500,000	12,774,359
2019	64,261,146	4,344,053	877,165	1,686,855	13,655,152	-1,461,613	7,500,000	11,601,612
2020	56,228,503	3,801,047	767,519	1,475,998	13,655,152	-1,770,851	7,500,000	10,428,865
2021	48,195,860	3,258,040	657,873	1,265,141	13,655,152	-2,080,089	7,500,000	9,256,118
2022	40,163,216	2,715,033	548,228	1,054,284	13,655,152	-2,389,327	7,500,000	8,083,371
2023	32,130,573	2,172,027	438,582	843,428	13,655,152	-2,698,565	7,500,000	6,910,624
2024	24,097,930	1,629,020	328,937	632,571	13,655,152	-3,007,803	7,500,000	5,737,876
2025	16,065,287	1,086,013	219,291	421,714	13,655,152	-3,317,041	7,500,000	4,565,129
2026	8,032,643	543,007	109,646	210,857	13,655,152	-3,626,279	7,500,000	3,392,382
2027	0	0	0	0	13,655,152	-3,935,517	7,500,000	2,219,635
Sum of Annual Capital Revenue Requirements								210,621,381

FIXED CHARGE RATE (FCR) - NOMINAL AND REAL LEVELIZED

TPI = $273,103,044

End of Year	Capital Revenue Req'ts Nominal A	Present Worth Factor Nominal B	Product of Columns A and B C	Capital Revenue Req'ts Real D	Present Worth Factor Real E	Product of Columns D and E F
2008	4,649,083	0.9118	4,239,189	4,254,570	0.9392	3,995,843
2009	43,496,777	0.8314	36,164,967	38,646,323	0.8821	34,088,950
2010	29,096,952	0.7581	22,059,415	25,099,287	0.8284	20,793,114
2011	19,987,959	0.6913	13,817,531	16,739,601	0.7781	13,024,348
2012	16,923,920	0.6303	10,667,888	13,760,696	0.7307	10,055,508
2013	10,271,811	0.5748	5,903,914	8,108,662	0.6863	5,565,005
2014	4,565,348	0.5241	2,392,668	3,498,959	0.6446	2,255,319
2015	3,392,601	0.4779	1,621,275	2,524,414	0.6054	1,528,207
2016	2,219,854	0.4358	967,306	1,603,669	0.5686	911,779
2017	1,047,106	0.3973	416,050	734,419	0.5340	392,167
2018	12,774,359	0.3623	4,628,173	8,698,717	0.5015	4,362,497
2019	11,601,612	0.3304	3,832,695	7,670,032	0.4710	3,612,683
2020	10,428,865	0.3012	3,141,510	6,693,892	0.4424	2,961,175
2021	9,256,118	0.2747	2,542,411	5,768,107	0.4155	2,396,467
2022	8,083,371	0.2505	2,024,533	4,890,572	0.3902	1,908,317
2023	6,910,624	0.2284	1,578,211	4,059,263	0.3665	1,487,616
2024	5,737,876	0.2082	1,194,853	3,272,231	0.3442	1,126,264
2025	4,565,129	0.1899	866,826	2,527,601	0.3233	817,067
2026	3,392,382	0.1731	587,353	1,823,573	0.3036	553,637
2027	2,219,635	0.1579	350,422	1,158,411	0.2851	330,306
	210,621,381		118,997,193	161,532,997		112,166,267

	Nominal $		Real $
1. The present value is at the beginning of 2006 and results from the sum of the products of the annual present value factors times the annual requirements	118,997,193		112,166,267
2. Escalation Rate	3%		3%
3. After Tax Discount Rate = i	9.67%		6.47%
4. Capital recovery factor value = i(1+i)"/(1+i)"-1 where book life = n and discount rate = i	0.114818371		0.090575595
5. The levelized annual charges (end of year) = Present Value (Item 1) * Capital Recovery Factor (Item 4)	13,663,064		10,159,526
6. Booked Cost	273,103,044		273,103,044
7. The levelized annual fixed charge rate (levelized annual charges divided by the booked cost)	0.0500		0.0372

LEVELIZED COST OF ELECTRICITY CALCULATION - UTILITY GENERATOR

COE = ((TPI * FCR) + AO&M + LO&R) / AEP
In other words...
The Cost of Electricity =
The Sum of the Levelized Plant Investment + Annual O&M Cost + Levelized Overhaul and Replacement Cost
Divided by the Annual Electric Energy Consumption

NOMINAL RATES

	Value	Units	From
TPI	$273,103,044	$	From TPI
FCR	5.00%	%	From FCR
AO&M	$12,356,000	$	From AO&M
LO&R = O&R/Life	$1,326,600	$	From LO&R
AEP =	300,000	MWeh/yr	From Assumptions
COE - TPI X FCR	4.55	cents/kWh	
COE - AO&M	4.12	cents/kWh	
COE - LO&R	0.44	cents/kWh	
COE	$0.0912	$/kWh	Calculated
COE	9.12	cents/kWh	Calculated

REAL RATES

	Value	Units	From
TPI	$273,103,044	$	From TPI
FCR	3.72%	%	From FCR
AO&M	$12,356,000	$	From AO&M
LO&R = O&R/Life	$1,326,600	$	From LO&R
AEP =	300,000	MWeh/yr	From Assumptions
COE - TPI X FCR	3.39	cents/kWh	
COE - AO&M	4.12	cents/kWh	
COE - LO&R	0.44	cents/kWh	
COE	$0.0795	$/kWh	Calculated
COE	7.95	cents/kWh	Calculated

Appendix C - Commercial Plant Cost Economics Worksheet – NUG – With REC

INSTRUCTIONS

Fill in first four worksheets (or use default values) - the last two worksheets are automatically calculated. Refer to E2I EPRI Economic Methodology Report 004 Rev 2

Indicates Input Cell (either input or use default values)

Indicates a Calculated Cell (do not input any values)

Sheet 1. Total Plant Cost/Total Plant Investment (TPC/TPI) - 2004$

1 Enter Component Unit Cost and No. of Units per System
2 Worksheet sums component costs to get TPC
3 Worksheet adds the value of the construction loan payments to get TPI

Sheet 2. AO&M (Annual Operation and Maintenance Cost) - 2004$

1 Enter Labor Hrs and Cost by O&M Type)
2 Enter Parts and Supplies Cost by O&M Type)
3 Worksheet Calculates Total Annual O&M Cost

Sheet 3. O&R (Overhaul and Replacement Cost) - 2004$

1 Enter Year of Cost and O&R Cost per Item
2 Worksheet calculates inflation to the year of the cost of the O&R

Sheet 4. Assumptions (Project, Financial and Others)

1 Enter project, financial and other assumptions or leave default values

Sheet 5. Income Statement - Assuming no capacity factor income - Current $

1 2008 Energy payments(2002-2008) = AEP X 2002 wholesale price X 92% (to adjust price from 2002 to 2008 (an 8% decline) X Inflation from 2002 to 2008
2009-2011 Energy payments = 2008 Energy Payment X Inflation
2012-2027 Energy payments = 2011 Energy Price X 0.3% Price escalation X Inflation
2 Calculates State Investment and Producient tax credit
3 Calculates Federal Investment and Production Tax Credit
4 Scheduled O&M from TPC worksheet with inflation
5 Scheduled O&R from TPC worksheet with inflation
8 Earnings before EBITDA = total revenues less total operating costs
9 Tax Depreciation = Assumed MACRS rate X TPI
10 Interest paid = Annual interest given assumed debt interest rate and life of loan
11 Taxable earnings = Tax Depreciation + Interest Paid
12 State Tax = Taxable Earnings x state tax rate
13 Federal Tax = (Taxable earnings - State Tax) X Federal tax rate
14 Total Tax Obligation = Total State + Federal Tax

Sheet 6. Cash Flow Statement - Current $

1 EBITDA
2 Taxes Paid
3 Cash Flow From Operations = EBITDA - Taxes Paid
4 Debt Service = Principal + Interest paid on the debt loan
5 Net Cash Flow after Tax
Year of Start of Ops minus 1 = Equity amount
Year of Start of Ops = Cash flow from ops - debt service
Year of Start of Ops Plus 1 to N = Cash flow from ops - debt service
6 Cum Net Cash Flow After Taxes = previous year net cash flow + current year net cash flow
7 Cum IRR on net cash Flow After Taxes = discount rate that sets the present worth of the net cash flows over the book life equal to the equity investment at the commercial operations

TOTAL PLANT COST (TPC) - 2004$

TPC Component	Unit	Unit Cost	Total Cost (2004$)	Notes and Assumptions
Procurement				
Onshore Trans & Grid I/C	1	$6,000,000	$6,000,000	
Subsea Cables	1	$4,886,000	$4,886,000	
Mooring	206	$116,941	$24,089,846	
Power Conversion Modules (set of 3)	206	$623,961	$128,535,966	
Concrete Structure Sections	206	$244,800	$50,428,800	
Facilities	1	$12,000,000	$12,000,000	
Installation	1	$12,170,000	$12,170,000	
Construction Management	1	$11,297,000	$11,297,000	
TOTAL			$249,407,612	

TOTAL PLANT INVESTMENT (TPI) - 2004 $

End of Year	Total Cash Expended TPC ($2004)	Before Tax Construction Loan Cost at Debt Financing Rate	2004 Value of Construction Loan Payments	TOTAL PLANT INVESTMENT (TPC + Loan Value) ($2004)
2006	$124,703,806	$9,976,304	$9,012,019	$133,715,825
2007	$124,703,806	$19,952,609	$16,281,876	$140,985,682
Total	$249,407,612	$29,928,913	$25,293,895	$274,701,507

ANNUAL OPERATING AND MAINTENANCE COST (AO&M) - 2004$

Costs	Yrly Cost	Amount	
LABOR	$2,516,000	$2,516,000	
PARTS AND SUPPLIES (2%)	$4,920,000	$4,920,000	
INSURANCE (2%)	$4,920,000	$4,920,000	
Total		$12,356,000	

OVERHAUL AND REPLACEMENT COST (OAR) - 2004$

O&R Costs	Year of Cost	Cost in 2004$	
10 Year Retrofit			
Operation	10	$10,570,000	
Parts	10	$15,962,000	
Total		$26,532,000	

FINANCIAL ASSUMPTIONS

(default assumptions in pink background - without line numbers are calculated values)

1	Rated Plant Capacity ©	90	MW
2	Annual Electric Energy Production (AEP)	300,000	MWeh/yr
	Therefore, Capacity Factor	38.03	%
3	Year Constant Dollars	2004	Year
4	Federal Tax Rate	35	%
5	State	Mass	
6	State Tax Rate	9.5	%
	Composite Tax Rate (t)	0.41175	%
	t/(1-t)	0.7000	
7	Book Life	20	Years
8	Construction Financing Rate	8	
9	Common Equity Financing Share	30	%
10	Preferred Equity Financing Share	0	%
11	Debt Financing Share	70	%
12	Common Equity Financing Rate	17	%
13	Preferred Equity Financing Rate	0	%
14	Debt Financing Rate	8	%
	Current $ Discount Rate Before-Tax	10.7	%
	Current $ Discount Rate After-Tax	8.39	%
15	Inflation rate	3	%
16	Federal Investment Tax Credit	10	% 1st year only
17	Federal Production Tax Credit	0.018	$/kWh for 1st 10 yrs
18	State Investment Tax Credit	0	% 1st year only % of TPI up to $2.5M
19	Renewable Energy Certificate	0.025	$/kWh
20	Wholesale electricity price - 2002$	0.065	$/kWh
21	Decline in wholesale elec. price from 2002 to 2008	8	%
22	Yearly Unscheduled O&M	5	% of Sch O&M cost
23	MACRS Year 1	0.2000	
24	MACRS Year 2	0.3200	
25	MACRS Year 3	0.1920	
26	MACRS Year 4	0.1152	
27	MACRS Year 5	0.1152	
28	MACRS Year 6	0.0576	
29	State Tax Deduction	$12,170,000	Installtion Cost

INCOME STATEMENT ($) **CURRENT DOLLARS**

Description/Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
REVENUES																				
Energy Payments	21,421,298	22,063,937	22,725,855	23,407,631	24,182,189	24,982,378	25,809,045	26,663,066	27,545,347	28,456,823	29,398,459	30,371,254	31,376,239	32,414,478	33,487,074	34,595,161	35,739,915	36,922,548	36,922,548	38,144,316
Renewable Energy Certificates	7,500,000	7,725,000	7,956,750	8,195,453	8,441,316	8,694,556	8,955,392	9,224,054	9,500,776	9,785,799	10,079,373	10,381,754	10,693,207	11,014,003	11,344,423	11,684,756	12,035,298	12,396,357	12,768,248	13,151,295
Federal ITC and PTC	32,870,151	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000										
TOTAL REVENUES	61,791,449	35,188,937	36,082,605	37,003,083	38,023,505	39,076,934	40,164,437	41,287,120	42,446,123	43,642,622	39,477,832	40,753,008	42,069,445	43,428,481	44,831,496	46,279,916	47,775,213	49,318,906	49,690,796	51,295,611
AVG $/KWH	0.206	0.117	0.120	0.123	0.127	0.130	0.134	0.138	0.141	0.145	0.132	0.136	0.140	0.145	0.149	0.154	0.159	0.164	0.166	0.171
OPERATING COSTS																				
Scheduled and Unscheduled O&M	13,906,787	14,323,990	14,753,710	15,196,321	15,652,211	16,121,777	16,605,431	17,103,594	17,616,702	18,145,203	18,689,559	19,250,245	19,827,753	20,422,585	21,035,263	21,666,321	22,316,310	22,985,800	23,675,374	24,385,635
Scheduled O&R	0	0	0	0	0	0	0	0	0	0	60,703,297	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	13,906,787	14,323,990	14,753,710	15,196,321	15,652,211	16,121,777	16,605,431	17,103,594	17,616,702	18,145,203	79,392,856	19,250,245	19,827,753	20,422,585	21,035,263	21,666,321	22,316,310	22,985,800	23,675,374	24,385,635
EBITDA	47,884,662	20,864,947	21,328,895	21,806,762	22,371,294	22,955,156	23,559,006	24,183,527	24,829,421	25,497,419	-39,915,024	21,502,763	22,241,693	23,005,896	23,796,234	24,613,596	25,458,903	26,333,106	26,015,423	26,909,976
Tax Depreciation	54,940,301	87,904,482	52,742,689	31,645,614	31,645,614	15,822,807	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Paid	15,383,284	15,047,126	14,684,074	14,291,979	13,868,515	13,411,175	12,917,248	12,383,806	11,807,689	11,185,483	10,513,500	9,787,758	9,003,957	8,157,453	7,243,227	6,255,864	5,189,512	4,037,851	2,794,058	1,450,761
State Installation Cost Tax Deduction	12,170,000																			
TAXABLE EARNINGS	-34,608,924	-82,086,661	-46,097,868	-24,130,830	-23,142,835	-6,278,826	10,641,759	11,799,721	13,021,732	14,311,936	-50,428,524	11,715,004	13,237,735	14,848,443	16,553,006	18,357,732	20,269,391	22,295,255	23,221,365	25,459,215
State Tax	-3,287,848	-7,798,233	-4,379,297	-2,292,429	-2,198,569	-596,488	1,010,967	1,120,973	1,237,065	1,359,634	-4,790,710	1,112,925	1,257,585	1,410,602	1,572,536	1,743,985	1,925,592	2,118,049	2,206,030	2,418,625
Federal Tax	-10,962,377	-26,000,950	-14,601,500	-7,643,440	-7,330,493	-1,988,818	3,370,777	3,737,561	4,124,634	4,533,306	-15,973,235	3,710,728	4,193,053	4,703,244	5,243,165	5,814,812	6,420,330	7,062,022	7,355,367	8,064,206
TOTAL TAX OBLIGATIONS	-14,250,224	-33,799,183	-18,980,797	-9,935,869	-9,529,062	-2,585,307	4,381,744	4,858,535	5,361,698	5,892,940	-20,763,945	4,823,653	5,450,637	6,113,847	6,815,700	7,558,796	8,345,922	9,180,071	9,561,397	10,482,832

CASH FLOW STATEMENT

Description/Year	2006	2007	2008	2009	2010	2011
EBITDA			47,884,662	20,864,947	21,328,895	21,806,762
Taxes Paid			-14,250,224	-33,799,183	-18,980,797	-9,935,869
CASH FLOW FROM OPS			62,134,886	54,664,129	40,309,692	31,742,631
Debt Service			-19,585,269	-19,585,269	-19,585,269	-19,585,269
NET CASH FLOW AFTER TAX		-82,410,452	42,549,618	35,078,861	20,724,424	12,157,363
CUM NET CASH FLOW		-82,410,452	-39,860,834	-4,781,974	15,942,450	28,099,813

IRR ON NET CASH FLOW AFTER TAX

Description/Year	2012	2013	2014	2015	2016	2017	2018	2019
EBITDA	22,371,294	22,955,156	23,559,006	24,183,527	24,829,421	25,497,419	-39,915,024	21,502,763
Taxes Paid	-9,529,062	-2,585,307	4,381,744	4,858,535	5,361,698	5,892,940	-20,763,945	4,823,653
CASH FLOW FROM OPS	31,900,357	25,540,463	19,177,262	19,324,992	19,467,723	19,604,479	-19,151,079	16,679,110
Debt Service	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269
NET CASH FLOW AFTER TAX	12,315,088	5,955,194	-408,006	-260,277	-117,546	19,211	-38,736,348	-2,906,159
CUM NET CASH FLOW	40,414,901	46,370,095	45,962,088	45,701,811	45,584,266	45,603,476	6,867,128	3,960,969

Description/Year	2020	2021	2022	2023	2024	2025	2026	2027
EBITDA	22,241,693	23,005,896	23,796,234	24,613,596	25,458,903	26,333,106	26,015,423	26,909,976
Taxes Paid	5,450,637	6,113,847	6,815,700	7,558,796	8,345,922	9,180,071	9,561,397	10,482,832
CASH FLOW FROM OPS	16,791,055	16,892,049	16,980,533	17,054,800	17,112,981	17,153,035	16,454,026	16,427,144
Debt Service	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269
NET CASH FLOW AFTER TAX	-2,794,214	-2,693,219	-2,604,735	-2,530,469	-2,472,288	-2,432,234	-3,131,243	-3,158,125
CUM NET CASH FLOW	1,166,755	-1,526,464	-4,131,199	-6,661,668	-9,133,956	-11,566,190	-14,697,433	-17,855,558
IRR ON NET CASH FLOW AFTER TAX								7.6%

Appendix D - Commercial Plant Cost Economics Worksheet – NUG – W/O REC

INSTRUCTIONS

Fill in first four worksheets (or use default values) - the last two worksheets are automatically calculated. Refer to E2I EPRI Economic Methodology Report 004 Rev 2

Indicates Input Cell (either input or use default values)

Indicates a Calculated Cell (do not input any values)

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1 Enter Component Unit Cost and No. of Units per System
2 Worksheet sums component costs to get TPC
3 Worksheet adds the value of the construction loan payments to get TPI

Sheet 2. AO&M (Annual Operation and Maintenance Cost) - 2004$

1 Enter Labor Hrs and Cost by O&M Type)
2 Enter Parts and Supplies Cost by O&M Type)
3 Worksheet Calculates Total Annual O&M Cost

Sheet 3. O&R (Overhaul and Replacement Cost) - 2004$

1 Enter Year of Cost and O&R Cost per Item
2 Worksheet calculates inflation to the year of the cost of the O&R

Sheet 4. Assumptions (Project, Financial and Others)

1 Enter project, financial and other assumptions or leave default values

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1 2008 Energy payments(2002-2008) = AEP X 2002 wholesale price X 92% (to adjust price from 2002 to 2008 (an 8% decline) X Inflation from 2002 to 2008
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5 Scheduled O&R from TPC worksheet with inflation
8 Earnings before EBITDA = total revenues less total operating costs
9 Tax Depreciation = Assumed MACRS rate X TPI
10 Interest paid = Annual interest given assumed debt interest rate and life of loan
11 Taxable earnings = Tax Depreciation + Interest Paid
12 State Tax = Taxable Earnings x state tax rate
13 Federal Tax = (Taxable earnings - State Tax) X Federal tax rate
14 Total Tax Obligation = Total State + Federal Tax

Sheet 6. Cash Flow Statement - Current $

1 EBITDA
2 Taxes Paid
3 Cash Flow From Operations = EBITDA - Taxes Paid
4 Debt Service = Principal + Interest paid on the debt loan
5 Net Cash Flow after Tax
Year of Start of Ops minus 1 = Equity amount
Year of Start of Ops = Cash flow from ops - debt service
Year of Start of Ops Plus 1 to N = Cash flow from ops - debt service
6 Cum Net Cash Flow After Taxes = previous year net cash flow + current year net cash flow
7 Cum IRR on net cash Flow After Taxes = discount rate that sets the present worth of the net cash flows over the book life equal to the equity investment at the commercial operations

TOTAL PLANT COST (TPC) - 2004$

TPC Component	Unit	Unit Cost	Total Cost (2004$)	Notes and Assumptions
Procurement				
Onshore Trans & Grid I/C	1	$6,000,000	$6,000,000	
Subsea Cables	1	$4,886,000	$4,886,000	
Mooring	206	$116,941	$24,089,846	
Power Conversion Modules (set of 3)	206	$623,961	$128,535,966	
Concrete Structure Sections	206	$244,800	$50,428,800	
Facilities	1	$12,000,000	$12,000,000	
Installation	1	$12,170,000	$12,170,000	
Construction Management	1	$11,297,000	$11,297,000	
TOTAL			$249,407,612	

TOTAL PLANT INVESTMENT (TPI) - 2004 $

End of Year	Total Cash Expended TPC ($2004)	Before Tax Construction Loan Cost at Debt Financing Rate	2004 Value of Construction Loan Payments	TOTAL PLANT INVESTMENT (TPC + Loan Value) ($2004)
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2007	$124,703,806	$19,952,609	$16,281,876	$140,985,682
Total	$249,407,612	$29,928,913	$25,293,895	$274,701,507

ANNUAL OPERATING AND MAINTENANCE COST (AO&M) - 2004$

Costs	Yrly Cost	Amount	
LABOR	$2,516,000	$2,516,000	
PARTS AND SUPPLIES (2%)	$4,920,000	$4,920,000	
INSURANCE (2%)	$4,920,000	$4,920,000	
Total		$12,356,000	

OVERHAUL AND REPLACEMENT COST (OAR) - 2004$

O&R Costs	Year of Cost	Cost in 2004$	
10 Year Retrofit			
Operation	10	$10,570,000	
Parts	10	$15,962,000	
Total		$26,532,000	

FINANCIAL ASSUMPTIONS

(default assumptions in pink background - without line numbers are calculated values)

1	Rated Plant Capacity ©	90	MW
2	Annual Electric Energy Production (AEP)	300,000	MWeh/yr
	Therefore, Capacity Factor	38.03	%
3	Year Constant Dollars	2004	Year
4	Federal Tax Rate	35	%
5	State	Mass	
6	State Tax Rate	9.5	%
	Composite Tax Rate (t)	0.41175	%
	t/(1-t)	0.7000	
7	Book Life	20	Years
8	Construction Financing Rate	8	
9	Common Equity Financing Share	30	%
10	Preferred Equity Financing Share	0	%
11	Debt Financing Share	70	%
12	Common Equity Financing Rate	17	%
13	Preferred Equity Financing Rate	0	%
14	Debt Financing Rate	8	%
	Current $ Discount Rate Before-Tax	10.7	%
	Current $ Discount Rate After-Tax	8.39	%
15	Inflation rate	3	%
16	Federal Investment Tax Credit	10	% 1st year only
17	Federal Production Tax Credit	0.018	$/kWh for 1st 10 yrs
18	State Investment Tax Credit	0	% 1st year only
			% of TPI up to $2.5M
19	Renewable Energy Certificate	0.000	$/kWh
20	Wholesale electricity price - 2002$	0.065	$/kWh
21	Decline in wholesale elec. price from 2002 to 2008	8	%
22	Yearly Unscheduled O&M	5	% of Sch O&M cost
23	MACRS Year 1	0.2000	
24	MACRS Year 2	0.3200	
25	MACRS Year 3	0.1920	
26	MACRS Year 4	0.1152	
27	MACRS Year 5	0.1152	
28	MACRS Year 6	0.0576	
29	State Tax Deduction	$12,170,000	Installtion Cost

INCOME STATEMENT ($) **CURRENT DOLLARS**

Description/Year	2008	2009	2010	2011	2012	2013	2014	2015
REVENUES								
Energy Payments	21,421,298	22,063,937	22,725,855	23,407,631	24,182,189	24,982,378	25,809,045	26,663,066
Renewable Energy Certificates	0	0	0	0	0	0	0	0
Federal ITC and PTC	32,870,151	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000
TOTAL REVENUES	54,291,449	27,463,937	28,125,855	28,807,631	29,582,189	30,382,378	31,209,045	32,063,066
AVG $/KWH	0.181	0.092	0.094	0.096	0.099	0.101	0.104	0.107
OPERATING COSTS								
Scheduled and Unscheduled O&M	13,906,787	14,323,990	14,753,710	15,196,321	15,652,211	16,121,777	16,605,431	17,103,594
Scheduled O&R	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
TOTAL	13,906,787	14,323,990	14,753,710	15,196,321	15,652,211	16,121,777	16,605,431	17,103,594
EBITDA	40,384,662	13,139,947	13,372,145	13,611,309	13,929,978	14,260,601	14,603,614	14,959,473
Tax Depreciation	54,940,301	87,904,482	52,742,689	31,645,614	31,645,614	15,822,807	0	0
Interest Paid	15,383,284	15,047,126	14,684,074	14,291,979	13,868,515	13,411,175	12,917,248	12,383,806
State Installation Cost Tax Deduction	12,170,000							
TAXABLE EARNINGS	-42,108,924	-89,811,661	-54,054,618	-32,326,283	-31,584,151	-14,973,381	1,686,366	2,575,667
State Tax	-4,000,348	-8,532,108	-5,135,189	-3,070,997	-3,000,494	-1,422,471	160,205	244,688
Federal Tax	-13,338,002	-28,447,844	-17,121,800	-10,239,350	-10,004,280	-4,742,819	534,157	815,842
TOTAL TAX OBLIGATIONS	-17,338,349	-36,979,951	-22,256,989	-13,310,347	-13,004,774	-6,165,290	694,361	1,060,531

Description/Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Energy Payments	27,545,347	28,456,823	29,398,459	30,371,254	31,376,239	32,414,478	33,487,074	34,595,161	35,739,915	36,922,548	36,922,548	38,144,316
Renewable Energy Certificates	0	0	0	0	0	0	0	0	0	0	0	0
Federal ITC and PTC	5,400,000	5,400,000										
TOTAL REVENUES	32,945,347	33,856,823	29,398,459	30,371,254	31,376,239	32,414,478	33,487,074	34,595,161	35,739,915	36,922,548	36,922,548	38,144,316
AVG $/KWH	0.110	0.113	0.098	0.101	0.105	0.108	0.112	0.115	0.119	0.123	0.123	0.127
Scheduled and Unscheduled O&M	17,616,702	18,145,203	18,689,559	19,250,245	19,827,753	20,422,585	21,035,263	21,666,321	22,316,310	22,985,800	23,675,374	24,385,635
Scheduled O&R	0	0	60,703,297	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	17,616,702	18,145,203	79,392,856	19,250,245	19,827,753	20,422,585	21,035,263	21,666,321	22,316,310	22,985,800	23,675,374	24,385,635
EBITDA	15,328,646	15,711,620	-49,994,397	11,121,009	11,548,486	11,991,893	12,451,811	12,928,840	13,423,604	13,936,749	13,247,175	13,758,681
Tax Depreciation	0	0	0	0	0	0	0	0	0	0	0	0
Interest Paid	11,807,689	11,185,483	10,513,500	9,787,758	9,003,957	8,157,453	7,243,227	6,255,864	5,189,512	4,037,851	2,794,058	1,450,761
TAXABLE EARNINGS	3,520,957	4,526,137	-60,507,897	1,333,250	2,544,529	3,834,441	5,208,583	6,672,976	8,234,093	9,898,898	10,453,117	12,307,920
State Tax	334,491	429,983	-5,748,250	126,659	241,730	364,272	494,815	633,933	782,239	940,395	993,046	1,169,252
Federal Tax	1,115,263	1,433,654	-19,165,876	422,307	805,979	1,214,559	1,649,819	2,113,665	2,608,149	3,135,476	3,311,025	3,898,534
TOTAL TAX OBLIGATIONS	1,449,754	1,863,637	-24,914,126	548,966	1,047,710	1,578,831	2,144,634	2,747,598	3,390,388	4,075,871	4,304,071	5,067,786

CASH FLOW STATEMENT

Description/Year	2006	2007	2008	2009	2010	2011
EBITDA			40,384,662	13,139,947	13,372,145	13,611,309
Taxes Paid			-17,338,349	-36,979,951	-22,256,989	-13,310,347
CASH FLOW FROM OPS			57,723,011	50,119,898	35,629,134	26,921,656
Debt Service			-19,585,269	-19,585,269	-19,585,269	-19,585,269
NET CASH FLOW AFTER TAX		-82,410,452	38,137,743	30,534,629	16,043,866	7,336,388
CUM NET CASH FLOW		-82,410,452	-44,272,709	-13,738,080	2,305,786	9,642,173

IRR ON NET CASH FLOW AFTER TAX

Description/Year	2012	2013	2014	2015	2016	2017	2018	2019
EBITDA	13,929,978	14,260,601	14,603,614	14,959,473	15,328,646	15,711,620	-49,994,397	11,121,009
Taxes Paid	-13,004,774	-6,165,290	694,361	1,060,531	1,449,754	1,863,637	-24,914,126	548,966
CASH FLOW FROM OPS	26,934,752	20,425,890	13,909,253	13,898,942	13,878,892	13,847,983	-25,080,270	10,572,043
Debt Service	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269
NET CASH FLOW AFTER TAX	7,349,484	840,622	-5,676,016	-5,686,327	-5,706,377	-5,737,286	-44,665,539	-9,013,226
CUM NET CASH FLOW	16,991,657	17,832,279	12,156,263	6,469,936	763,559	-4,973,726	-49,639,266	-58,652,491

Description/Year	2020	2021	2022	2023	2024	2025	2026	2027
EBITDA	11,548,486	11,991,893	12,451,811	12,928,840	13,423,604	13,936,749	13,247,175	13,758,681
Taxes Paid	1,047,710	1,578,831	2,144,634	2,747,598	3,390,388	4,075,871	4,304,071	5,067,786
CASH FLOW FROM OPS	10,500,776	10,413,062	10,307,176	10,181,242	10,033,217	9,860,878	8,943,104	8,690,895
Debt Service	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269	-19,585,269
NET CASH FLOW AFTER TAX	-9,084,492	-9,172,206	-9,278,092	-9,404,027	-9,552,052	-9,724,391	-10,642,165	-10,894,374
CUM NET CASH FLOW	-67,736,984	-76,909,190	-86,187,282	-95,591,309	-105,143,361	-114,867,752	-125,509,917	-136,404,291

#NUM!

Adams, Karen K NAE

004469

From: Matt McLoughlin [matt@secondwind.com]

Sent: Thursday, February 24, 2005 11:13 AM

To: Energy, Wind NAE

Subject: wind farm

I live is Scituate MA and would support this project if it were off my coast. Why is it okay to have a power plant in Everett or Quincy where the blue collar people live?The folks on the cape do not have a problem with that.

We need to move forward in this direction to embrace wind. If you do not, you will be in the group responsible for the consequences in the decades to come. Please make a stand and do what's right.

Matt Mcloughlin
42 Ann Vinal Rd.
Scituate,MA 02066
781-545-2708

Adams, Karen K NAE

From: Daniel Ciarcia [d_ciarcia@hotmail.com]
Sent: Thursday, February 24, 2005 12:15 PM
To: Energy, Wind NAE
Subject: Cape Wind

004470

CapeWind can set an example for the rest of the country and demonstrate an efficient, clean, and safe energy source for a large number of customers. It is very important to support this development and show the country and the world that clean energy is possible. It is time to put technology to action, and, not let old time, stubborn residents on the shores denounce the most constructive energy solution to date. Less oil use means less pollution, and, a reduced chance of another oil spill.

Support and promote the CapeWind project. Everyone has something to gain by this project.

Regards,

Dan Ciarcia

Windham, NH

Adams, Karen K NAE

From: Jim Richman [artframe01@earthlink.net]
Sent: Thursday, February 24, 2005 12:29 PM
To: Energy, Wind NAE
Cc: ann.canady@state.ma.us
Subject: Wind Farm (sent 2/24/05)

004471

Dear Karen Kirk-Adams / secretary Ellen Roy Herzfelder, In regards to the wind farm: Please do not allow our prestine environment to undergo such a horrible change as that proposed by Cape Wind. The Cape is such an ecologically and environmentally fragile place. . .The Cape is an international tourist spot. . .how can we even think of destroying such a truely beautiful place where we are most fortunate to live. We must save this delicate and beathtakingly beautiful land.
The private developers only interest is money, don't let their greed destroy our beautiful Cape!! Sincerly, **Jim and Camilla Richman Yarmouth, Ma.**

--- Jim Richman
--- artframe01@earthlink.net
--- EarthLink: It's your Internet.

Adams, Karen K NAE

From: Rachel Pachter [rpachter@capewind.org]
Sent: Thursday, February 24, 2005 12:10 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004472

Sincerely,

Rachel Pachter
PO Box 1611
Wellfleet, MA 02675

cc:
Capewind

Adams, Karen K NAE

From: James Kinney [jfkindc@aol.com]
Sent: Thursday, February 24, 2005 12:10 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

I support wind energy.

Sincerely,

004473

James Kinney
1501 S Edgewood St
#575
Arlington, VA 22204

cc:
Capewind

Adams, Karen K NAE

From: Ted D. Conna [tconna@yahoo.com]
Sent: Thursday, February 24, 2005 12:12 PM
To: Energy, Wind NAE
Subject: supporting Cape Wind project

To: Karen Kirk-Adams, Army Corps of Engineers

004474

I am writing today to voice my strong support for the Cape Wind project. The project has been extensively studied and the environmental benefits of building it have been found to far outweigh the impacts. In a world wracked with violence, terrorism, and war, it would be hopelessly shortsighted not to take advantage of this opportunity to significantly reduce our dependence on foreign oil.

Sooner or later, history will force us to use energy more wisely and to produce it renewably. There is absolutely no good reason not to begin now.

sincerely,

Ted D. Conna
57 Hollywood St.
Worcester, MA 01610

=====

Pain is what you feel.
Suffering is what you think.

Adams, Karen K NAE

From: Jack Ubersax [ubers1@charter.net]
Sent: Wednesday, February 23, 2005 11:53 PM
To: Energy, Wind NAE
Subject: Cape Wind

004475

I have read a great deal about all types of renewable energy resources. I have been personally involved in the design and build of mechanical automation for the production of solar cells. I am, however, most impressed by what I have learned and seen involving the use of wind power as a method of energy production.

Several years ago, while on vacation in California, I passed several large ³wind farms² on the route from San Francisco to Yosemite. This was the first time I had ever seen the actual towers at work, making use of the prevailing winds in the area. I found them to be fascinating in their motion, and the residents with whom I spoke at that time seemed appreciative of both their physical presence and for the help that these towers were giving in the use of this natural energy source, and the assistance in lowering dependence upon petroleum and other, even less desirable energy sources.

I feel that the Cape Wind project presents us, in New England, with a rare opportunity to ³practice what we preach² in terms of the use of renewable energy resources, and the resultant diminished reliance on imported oil and gas. Our energy problems are legitimate, and will only continue to grow. To bicker in the current fashion over perceived negative aesthetics, when there is so much to be gained on the energy side, makes no sense to almost all with whom I have discussed the subject.

I certainly hope that approvals will be given, permitting the project to proceed per present planning.

Sincerely,

Jack Ubersax
Wilbraham, MA
413 596-6091

Adams, Karen K NAE

From: RG Foster [info@capewind.org]
Sent: Thursday, February 24, 2005 11:44 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004476

Sincerely,

RG Foster
165EMainSt#414
Chicopee, MA 01020

cc:
Capewind

Adams, Karen K NAE

From: Peter Manning [peterm@mcpheeusa.com]
Sent: Thursday, February 24, 2005 11:43 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

Sincerely,

004477

Peter Manning
34 woodridge circle
West hartford, CT 06107

cc:
Capewind

Adams, Karen K NAE

From: Angela Carney [angelacarney@comcast.net]
Sent: Thursday, February 24, 2005 11:42 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004478

Dear Ms. Karen Kirk-Adams:

Dear Senator:

I am writing to you regarding my support for the Cape Wind project. It is long overdue for our country to look into alternative forms of getting energy. It seems to me that the people who are having a problem with this program are snobs with the "not in my backyard" syndrome. They would probably happy with it if it were based in Roxbury as opposed to affecting their view from the East Chop Beach Club.

We need to send a clear message that everyone must do their part, not just the poor.

Sincerely,

Angela Carney

Sincerely,

Angela Carney
163 Summer Street
Medway, MA 02053

cc:
Capewind

Adams, Karen K NAE

From: Julian Astbury [Julian.Astbury@arup.com]
Sent: Thursday, February 24, 2005 11:37 AM
To: Energy, Wind NAE
Subject: Wind energy

My family and I are in full support of the Capewind proposal.
The support of wind power as a solution to our nation's energy crisis will help us preserve both our way of life and our planet's delicate ecosystem and is vital to our nation's future.
Regards

Julian Astbury
428 Massachusetts Ave, Apt 3
Arlington, MA 02474, USA
P: (+1) 781 316 0021
E: julian@astbury.tv

004479

Adams, Karen K NAE

From: cbkeegan [cbkeegan@comcast.net]
Sent: Thursday, February 24, 2005 11:30 AM
To: Energy, Wind NAE; mepa@state.ma.us
Subject: Cape Wind EIS Letter of Support

RE: Cape Wind EIS - Hearing Testimony- 12/16/2004

004480

My name is Cindy Keegan and this letter of support for Cape Wind has been modified form my planned testimony at the 12/16/04 hearing where I had to leave prior to my opportunity to speak. I am a resident of Salem, MA and represent Salem Alliance for the Environment (SAFE), with a membership of over 700. As a resident of the north shore, I am forced to breathe the pollution that comes from the coal and oil power plant that resides in my front yard, and watch the plumes of steam, particulate, and pollution spew from its stacks painting a brown streak across my horizon. Not only does this pollution change my view but it negatively impacts the health of the citizens and the environment, as does the pollutants that are transported to this region from power sources to our west.

I want to ask anyone reading this to participate in a quick experiment - I want you to hold your breath and time it.
The longest record I could find was 2min 3 seconds by a female free diver.

So I ask - since the EIS review shows no significant negative impacts on the environment or the economy, why should people who live near existing and future polluting power plants have to continue to hold their breathes while we wait for cleaner non-polluting sources of power.

There are several things that those of us who have been involved in trying to push for cleaner emissions at our local power plant have learned that I'd like to share with you:

1) ISO wants more power generation in the future - we're still growing our demand, not only are new sources needed but old sources are not allowed to shutdown.
2) That while Coal is perceived as "cheap" - it has great health, environmental, and human rights consequences.
3) That Oil isn't much better for consequences and is running out of supply.
4) That there are major bottle necks with quantity and transportation of natural gas and it's expensive.
5) That nuclear still has not resolved its waste issues.
6) That terrorism is a large threat to any of these power generation methods.
7) That no environmental impact assessment will ever be considered for these old relics, nor will the effect on our viewshed.

What are the alternatives? Will opponents to this project offer up any that will have similar environmental and energy benefits?

It's time for hard decisions - we can no longer hope that energy issues will magically be solved. It's time to erect beacons to our future rather than expanding relics of our past. It's time for New England to once again set the precedent for our country. It's time to consider the beauty in a future that is less dependent on limited natural resources, to ramp up energy conservation, and time to support renewable energy projects.

To the opponents of this project let me say this - If it's just about the view - keep your eyes closed - for they must already be closed to avoid seeing the gashes in the earth from strip mining, the oil spills that occur all over the world, the human rights violations for the exploration of further limited resources, and the devastation caused by the ever increasing severe weather events. Yes, keep them closed, for it is much easier to keep your eyes closed than for the rest of us to continue to hold our breath.

Cindy Keegan
262 Lafayette St, Salem, MA 01970
978-821-4714

Adams, Karen K NAE

From: Lynne M. Poyant [lynne@hyannis.com]
Sent: Thursday, February 24, 2005 11:28 AM
To: Energy, Wind NAE
Subject: HACC Comments re: Cape Wind

February 24, 2005

004481

Karen Kirk-Adams

Cape Wind Energy EIS Project

U.S. Army Corps of Engineers, New England District

696 Virginia Road

Concord, MA 01742

Dear Ms. Kirk-Adams:

The Board of Directors of the Hyannis Area Chamber of Commerce unanimously supports developing clean, efficient, reasonably priced alternative energy sources. We have reviewed the data furnished by Cape Wind Associates and other non-related parties. While the Hyannis Area Chamber of Commerce supports the free enterprise system, and applauds business innovation, we are very troubled by Cape Wind's proposal to develop a series of wind energy turbines in Nantucket Sound.

The Hyannis Area Chamber of Commerce does not believe the benefits outweigh the potential economic and environmental consequences of this project. We believe that the curiosity factor of the wind energy plant will soon be displaced by the realization that it is a major blight on our horizon which may have repercussions on our fragile environment that cannot be measured in advance. The natural splendor that is Nantucket Sound to our south and Cape Cod Bay to our north plays a significant role in balancing our complex eco-system. It is the pristine quality of our shorelines and wetlands that make the Hyannis area a highly valued destination for leisure travel and residential activity alike. To risk this critical asset for a conceptual pilot project exceeds value of the possible benefit projected to date.

The Hyannis Area Chamber of Commerce strongly supports and encourages Cape Cod's political and regulatory leadership who have worked to prevent exploitation of Nantucket Sound for development of any type at this time.

The thought process is noble, but the location is unacceptable.

Please do not hesitate to call us at 508-775-7778 if we can offer further assistance.

Sincerely,

Richard J. Angelini Lynne M.
Poyant, IOM

President Executive
Director

RJA/LMP:tms

Lynne M. Poyant, IOM

Executive Director

Hyannis Area Chamber of Commerce

PO Box 100, Hyannis, MA 02601

phone: 508-775-7778 x11

fax: 508-775-7131

email: lynne@hyannis.com

url: www.hyannis.com

"The world is run by those who show up!"

Adams, Karen K NAE

From: Marcia A. Mellor [marciam@cape.com]
Sent: Thursday, February 24, 2005 11:36 AM
To: Energy, Wind NAE
Subject: Yes for windpower

0011582

Karin Kirk - Adams
Army Corp of Engnieers
I cannot beleive that the federal govenment is allowing the state to create a new state border which will obviously affect the decision making as to the proposed windfarm. We need an alternative source of clean power NOW.
"Global wind generation capacity now exceeds 23,000 megawatts - enough electricity to power more than 10 million households in industrialized countries"
National Geographic
April 2002
NIMBY mentality is an ignorance that we cannot afford to be swayed by. I lived in Onset, MA. for 20 years and watched the wind come up twice a day. If my husband had lived, we would have had a windmill in our yard. Our house already enjoyed passive solar and still does some 20 years later.
Nantucket Sound is a body of water already tainted by the 9 mile pipe excreteing processed sewage out of Boston. It is NOT Pristine
I have pictures of the Sandwich Electrial plant billowing its filth across the Cape. The air is not pristine.
You have the responceability to the citizenry of the Cape to see that this Windfarm is built for our protection- I'm sure you already know this. The few monied objectors can move elsewhere.

Marcia Mellor
24 Church Street
Yarmouthport, MA. 02675

Adams, Karen K NAE

From: George Teplansky [gteplansky@nc.rr.com]
Sent: Thursday, February 24, 2005 11:29 AM
To: Energy, Wind NAE; "Secretary Ellen Roy Herzfeldermepa"@state.ma.us
Subject: Cape Wind Energy

I am writing this email in SUPPORT of the Cape Cod Wind energy project. I believe strongly that it is important to develop energy sources that supplement the current coal, gas and nuclear power sources currently operating. As more countries, such as India and China, increase their demand for oil, the United States will be forced to pay substantially higher prices for oil. This is a significant threat to our economy. This alone should be enough impetus to develop other forms of energy source which can help supplement the use of oil,

004483

My wife and I own property on Cape Cod in Harwich, MA. We sail in Nantucket Sound and surrounding areas. The thought of wind mills as seen off shore is not challenging to our sense of beauty. Certainly there is no intrinsic beauty to most architectural projects. But,seeing a wind energy being used to develop electrical energy and helping minimize,if ever so slightly, the dependency on foreign oil is a worthwhile project.

We have moved from outside Boston to North Carolina in the past month, but plan to continue spending time in our summer home in West Harwich during the summer and continue our sailing in the beautiful waters of Nantucket Sound, viewing a significant statement of independence from foreign oil.

Please allow this project to continue.

George Teplansky
92 Belmont Road
West Harwich,MA 02671

10011 Hammock Bend
Chapel Hill, NC 27517

Adams, Karen K NAE

From: Mark Farber [mdfarber@earthlink.net]
Sent: Thursday, February 24, 2005 11:25 AM
To: Energy, Wind NAE
Subject: Support for the Wind Farm Proposal

004484

To whom it may concern:
I wish to speak out in support of the Nantucket Wind Farm.
Although I don't live on that side of the Cape, I do live within waterview (200 yards of Cape Cod Bay).
I've accepted that one day someone might propose a windfarm there, and i have no problem with the visual changes it might bring....especially at the distances Cape Wind is proposing.

I, for one, see the wind turbines as beautiful objects...as sculptures.

More importantly, I believe we as a people, locally and nationally, need to take responsibility for our energy future. We need to first "conserve" energy which Americans only do when it hits their wallets.

Adams, Karen K NAE

From: Daniel Prowten [prowten@earthlink.net]
Sent: Thursday, February 24, 2005 11:22 AM
To: Energy, Wind NAE
Subject: Horseshoe Shoal wind farm

Dear Engineers.....The wind energy project proposed for installation on Horseshoe Shoals in Vineyard Sound should be approved. Too many people living on the Vineyard seem to belive that our area is too precious to allow any transition to the modern world let alone acting in the National interest. Our dependance on imported energy sources only causes us grief and forces us into truly unsatisfactory choices just as our refusal on the Vineyard to install traffic signals leads to gridlock and opposition to cellular towers gives us at best marginal service. I have no sympathy to people who pay lip service to the environment while they act in their own perceived self interest......Daniel E Prowten West Tisbury MA.

Adams, Karen K NAE

From: Daniel Prowten [prowten@earthlink.net]
Sent: Thursday, February 24, 2005 11:23 AM
To: Energy, Wind NAE
Subject: Horseshoe Shoal wind farm

Dear Engineers.....The wind energy project proposed for installation on Horseshoe Shoals in Vineyard Sound should be approved. Too many people living on the Vineyard seem to belive that our area is too precious to allow any transition to the modern world let alone acting in the National interest. Our dependance on imported energy sources only causes us grief and forces us into truly unsatisfactory choices just as our refusal on the Vineyard to install traffic signals leads to gridlock and opposition to cellular towers gives us at best marginal service. I have no sympathy to people who pay lip service to the environment while they act in their own perceived self interest......Daniel E Prowten West Tisbury MA.

Adams, Karen K NAE

From: Peter R Bromer [peterbromer@earthlink.net]
Sent: Thursday, February 24, 2005 11:18 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004486

Dear Ms. Karen Kirk-Adams:

President Bush refuses to be a part of the Kyoto Accords, but you can help save the world from environmental catastrophe by approving this major project. It is good for the Cape, it is good for New England, It is good for America, It is good for the world, but most of all it is good for all of humanity.

Please vote yes to complete the Cape Wind project.

We are a wasteful people who love all the conveniences that low-cost power provides us.
Everyday we use more energy...the growing reliance on wireless technology and the need to recharge batteries for every new convenience item we buy.
Sadly, Americans may never change unless forced to.

Until then, we become more and more dependent on Foreign Powers who then gain control of our economic futures.

We need to take a "major step", and show others by our example, that we are serious about gaining our economic futures.

I have been following the Review Process for the Cape Wind proposal for the past 2+ years, and I believe they have answered all my early concerns about affects to fishing, boating, tourism, light pollution,
wildlife, visual pollution.

While holding Cape Wind to a very high standard, I request that you support this proposal at this time.

Sincerely,

Mark D. Farber
97 Governor Prence Road
Brewster, MA 02631
(508) 896- 3515

--- Mark Farber
--- mdfarber@earthlink.net
--- EarthLink: The #1 provider of the Real Internet.

Adams, Karen K NAE

From: Daniel Prowten [prowten@earthlink.net]
Sent: Thursday, February 24, 2005 11:23 AM
To: Energy, Wind NAE
Subject: Horseshoe Shoal windfarm

004485

Dear Engineers.....The wind energy project proposed for installation on Horseshoe Shoals in Vineyard Sound should be approved. Too many people living on the Vineyard seem to belive that our area is too precious to allow any transition to the modern world let alone acting in the National interest. Our dependance on imported energy sources only causes us grief and forces us into truly unsatisfactory choices just as our refusal on the Vineyard to install traffic signals leads to gridlock and opposition to cellular towers gives us at best marginal service. I have no sympathy to people who pay lip service to the environment while they act in their own perceived self interest......Daniel E Prowten West Tisbury MA.

Sincerely,

Peter R Bromer
13205 NE 3rd CT
Miami, FL 33161

cc:
Capewind

Adams, Karen K NAE

From: Michael Dettelbach [Frozenrope007@aol.com]
Sent: Thursday, February 24, 2005 11:12 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004487

Dear Ms. Karen Kirk-Adams:

Dear U.S. Army Corps of Engineers,

I just wanted to say that I am in full support of the Cape Wind Project!

Thank you in advance for your time.

Sincerely,

Michael Dettelbach

Sincerely,

Michael Dettelbach
Box # 167
3601 North Military Trail
Boca Raton, FL 33431

cc:
Capewind

Adams, Karen K NAE

From: Valerie Lynch [isnow2b@aol.com]
Sent: Thursday, February 24, 2005 11:09 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

001138

Sincerely,

Valerie Lynch
407 Pound Ridge Road
South Salem , NY 10590

cc:
Capewind

Adams, Karen K NAE

From: aaron lebeau [aaron_lebeau@yahoo.com]
Sent: Thursday, February 24, 2005 11:08 AM
To: Energy, Wind NAE
Subject: Wind Farm Support

Karen Kirk-Adams
Army Corps of Engineers

Dear Ms. Kirk-Adams,

004439

I am writing in support of the Cape Wind project. I believe that if the project passes environmental muster it must go forward. The United States must lead in the field of renewable energy and extricate itself from dependence on foreign fuels. It is clear to me that the less impact we have on the environment the better. How could reducing tons of pollutants not be expected to be beneficial to our world? Being originally from New Bedford, MA and formally living in Wareham and North Dartmouth, I am acutely aware of the oil spill that damaged the coastline in 2003. This project and projects like it would reduce incidences of this kind of disaster.

This project provides an excellent opportunity to provide energy for Cape Cod without introducing harmful externalities. I believe that the air and the water of the public, free of pollutants, is more important to the public good than the very slight view deprecation of a few property owners.

In conclusion, I believe that this project provides an excellent opportunity to benefit the environment, local industry, and employment.

Sincerely,
Aaron LeBeau
99 Upton St. Apt. A
Grafton, MA
01519

Adams, Karen K NAE

From: Peter Lynch [solarjpl@aol.com]
Sent: Thursday, February 24, 2005 11:08 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

Sincerely,

Peter Lynch
407 Pound Ridge Road
South Salem, NY 10590

cc:
Capewind

Adams, Karen K NAE

From: Kellie Hoyt [ky@twingles.com]
Sent: Thursday, February 24, 2005 11:07 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004490

Dear Ms. Karen Kirk-Adams:

I am writing to let you know how much I support the Cape Wind wind energy project. As someone concerned about: clean energy, preserving "nature," protecting the health and lives of all species, our nation's reliance on oil (foreign and domestic), our nation's development and market hold on new energy technologies, and jobs and tourism in the Northeast US, I have been following closely the Cape Wind saga for at least 2 years. Please consider carefully how well a wind farm could serve all of us with any of the concerns listed above. It's high time that we persued clean energy and Cape Wind is a great way to do it. Thank you.

Sincerely,

Kellie Hoyt
125 West Hoover Avenue Apt. 3B
Ann Arbor, MI 48103-5475

cc:
Capewind

Adams, Karen K NAE

From: Teichert, Kurt [Kurt_Teichert@brown.edu]
Sent: Thursday, February 24, 2005 11:00 AM
To: Energy, Wind NAE; mepa@state.ma.us
Subject: I support Cape Wind Proposal

004491

February 24, 2005

Karen Kirk-Adams
Army Corps of Engineers

Secretary Ellen Roy Herzfelder
Executive Office of Environmental Affairs

Hello,

I am a resident of Pocasset, in the town of Bourne. I have spent many hours in the last 30 years on the Sound fishing, windsurfing, boating and traveling to Nantucket by ferry and plane. I am writing to voice my support for the Cape Wind project.

While I believe the horseshoe shoals site is not ideal because the misperceptions and confusion the location has caused, it is critical that this project move forward. I travel off-cape each day to work at Brown University as Resource Efficiency Manager in the Department of Facilities Management and Adjunct Lecturer in Environmental Studies. I also serve on the advisory board to the Rhode Island Renewable Energy fund so I have reviewed many proposals for clean energy installations.

On my return home to the Cape each day, I am often greeted by a trail of emissions from the Mirant Canal Electric plant. In my personal and professional opinion, the visual and health impacts of plants like Canal far outweigh the perceived visual and environmental impacts of off-shore wind energy.

I support the Cape Wind proposal without reservation.

Regards,

Kurt Teichert
Box 535
260 Barlows Landing Rd
Pocasset, MA 02559
Home: 508-563-2981
Cell: 401-225-6549

Adams, Karen K NAE

From: Laurie Jodziewicz [Ljodziewicz@awea.org]
Sent: Thursday, February 24, 2005 11:07 AM
To: Energy, Wind NAE
Subject: AWEA Statement on Cape Wind

004492

Dear Ms. Kirk-Adams,

Please see the attached statement from the American Wind Energy Association on the Cape Wind Project. Please consider this statement as comments to the Army Corps of Engineers Draft Environmental Impact Statement.

If you have any questions, please feel free to contact me at the number below.

Best regards,
Laurie Jodziewicz

Laurie Jodziewicz
Communications & Policy Specialist
American Wind Energy Association
** NEW ADDRESS **
1101 14th Street, NW, 12th floor
Washington, DC 20005
Phone: (202) 383-2516
Fax: (202) 383-2505
Mobile: (202) 253-7181
ljodziewicz@awea.org

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American Wind Energy Association

www.awea.org

American Wind Energy Association (AWEA) Statement on Cape Wind
December 3, 2004

Offshore wind energy may soon provide an important source of clean electricity for the U.S., as it has in Europe for years. The release of the U.S. Army Corps of Engineers Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) clearly demonstrates the potential economic and environmental benefits of an offshore wind project in the U.S., the Cape Wind Energy Project to be located off of Cape Cod, Massachusetts.

AWEA calls attention to the positive findings of the draft EIS, and strongly supports the Cape Wind Energy Project moving forward.

Using a standard process developed by the Corps to review a wide range of proposed projects, the Corps found that the Cape Wind Energy Project would:

- create hundreds of jobs during the construction and operations phases;
- reduce greenhouse gas emissions by over 1 million tons each year; and
- reduce reliance on other fuels such as natural gas, saving ratepayers over $25 million per year.

Careful analysis by the Corps also indicates that many of the earlier concerns raised about potential impacts - on fishing, on navigation, on bird populations – will not be significant.

"Americans are now faced with real choices about energy – the question is not wind energy or nothing," says Randall Swisher, Executive Director of the American Wind Energy Association. "With such important benefits and such minimal impacts, the Cape Wind Energy Project should move forward. Tapping into the offshore wind resource is an important piece of continued clean energy growth."

The Corps explored many reservations voiced about the Cape Wind Energy Project, and found the project impacts to be minimal. For example, the Corps found little to no interference with fishing activity due to the wide spacing between the proposed turbines. The sizeable benefits reported include:

- $21.8 million more in economic output from Barnstable County, Massachusetts;
- a significant boost to Massachusetts' efforts to reduce ozone;
- improved air quality downwind at places like Acadia National Park in Maine;

(more)

- cumulative benefits to human health on the order of $53 million in annual savings; and,

- lower regional electricity prices saving $25 million annually.

The Cape Wind project, as well Long Island Power Authority's proposed offshore project, provide the first opportunities to champion offshore wind energy development in the U.S. Clearly, notwithstanding opponents' persistent efforts to create controversy and cloud the issue, the Cape Wind Energy Project has come through one of the most stringent examinations of any energy project with flying colors. It is time for debate to end and for the people of Massachusetts to experience the clean, renewable benefits of wind energy.

Adams, Karen K NAE

From: KImberly Bellemore [kimfabw@cox.net]
Sent: Thursday, February 24, 2005 11:01 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004493

Dear Ms. Karen Kirk-Adams:

The Saunderstown Institute is a non-profit, independent group of tax-paying citizens working in the fields of architecture, economics, engineering, health-fitness, and pharmacy, concerned with political issues in the United States.

The Institute strongly urges the U.S. Army Corps of Engineers to approve the environmental reports that have been prepared in support of the Cape Wind Energy Project.

In Cape Cod and New England and the Northeast as a whole, finding energy sources that are sustainable - ones that help to reduce our dependence on fossil fuel and slow the build-up of greenhouse gases- is becoming essential to our future.

Wind power is one of the most promising alternatives to fossil fuels, the worst human contribution to the greenhouse effect that is already causing perceptible changes in the world's weather. It has advantages over the others (including photovoltaics, water power, geothermal and biomass), notably that its technology is well-advanced and requires relatively small capital outlays.

Wind power has many advantages over other sustainable, nonpolluting sources of energy. Americans have become so addicted to oil, however, that we have let other countries forge far ahead in developing this ancient but still promising technology. Once again, we urge the you to make the decision to support this important project.

Sincerely,

KImberly Bellemore
251 Snuff Mill Road
Saunderstown, RI 02874

cc:
Capewind

Adams, Karen K NAE

From: nils shenholm [info@capewind.org]
Sent: Thursday, February 24, 2005 6:23 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004494

Dear Ms. Karen Kirk-Adams:

Sirs and Madams;

Tho' not a local resdent, I certainly access my electrical energy from the same grid...

I worked in the field of alternative energy as a young man, and consider these energy opportunities to be a gift that cannot and should not be refused...

It saddens me to listen to sound bytes of well-to-do coastal residents- bemoaning the supposed impacts of this project (and others like it-)...when in fact a good portion of their sentiment arises from old fashioned selfishness and NIMBY-ISM...
Perhaps these folks should not take there 24/7 electric convenience for granted- As I believe most of us do, and consider where and how their power is being produced...

In the region where I live , coal power produced acid rain threatens many natural systems, and continues to be a difficult political issue...the impacts of this "imported" smog are serious- yet it originates elsewhere- outside of our state boundary, so mitigation is nearly impossible

The so-called " to cheap to meter " Vt. Yankee Nuclear Power Plant is not only a safety and security threat like no other, but the expense is offensive...The small co-op that I buy power from was very pleased when the term of their old contract w/ Yankee expired, as it allowed the co-op board to secure cheaper and more reliable power elsewhere! We are now constructing a trash - methane turbine facility in Coventry Vt. that will further diversify the Co-op's portfolio, as well as taking advantage of a free fuel resource...

I think the nay-sayers might should have their power switched off for awhile- as a reminder that these issues, and decisions ,need to be considered in a larger view...the pun is intentional-

Respectfully,
Nils Shenholm

Sincerely,

nils shenholm
838 turner hill
s. duxbury, , VT 05660

Adams, Karen K NAE

From: jennifer nichols [jennifer.nichols@wayland.k12.ma.us]
Sent: Thursday, February 24, 2005 6:58 AM
To: Energy, Wind NAE
Subject: Cape W DEIS Comments

004495

Nichols_Cape Wind Letter.doc

Dear Ms Adams - please find my comments on the Cape Wind DEIS attached as "Nichols_Cape Wind Letter.doc".

Thank you for the opportunity to provide input on this important project. I will mail a signed copy of my letter today.

Best wishes,

Jennifer Nichols
25 Three Ponds Road
Wayland, MA 01778

Jennifer Nichols
Wayland Middle School
8th grade Earth Science
508 655 6670

Karen Kirk Adams
Cape Wind Energy Project
EIS Project Manager
Army Corps of Engineers
New England District
696 Virginia Rd.
Concord, MA 01742-2751
wind.energy@usace.army.mil

Thursday, February 24, 2005

Dear Ms Adams and USACE:

I am writing to comment on the Draft Environmental Impact Statement (DEIS) you have prepared for the Cape Wind Energy Project. I commend the USACE for the effort it has put in to examining the potential benefits and impacts of the project so far. New England urgently needs to develop energy sources that do not depend on fossil fuels, and which produce less pollution. Wind energy should play a prominent role in this, and the Cape Wind Project has enormous potential.

In the revised EIS, I request that the USACE include a serious comparison of the preferred alternative at Horseshoe Shoals (HSS) with the alternative South of Nantucket (STI) in terms of risks to flying birds. The STI site is outside of Nantucket Sound, and the sound is a major thoroughfare for seabirds flying to and from the shores of the Cape and Islands.

Wind turbines generally have a very low environmental impact when sited properly. However, they can have unacceptable impacts when placed in areas where there is high use by birds and bats. The preferred alternative site, on Horseshoe Shoals (HSS), is in the middle of Nantucket Sound, surrounded by the shorelines of Cape Cod, Nantucket, Martha's Vineyard and other smaller island and shoals. All of these are destinations for birds and the sound itself is used as a feeding and resting area for many birds. Thus, the HSS site is in an area where one expects considerable bird traffic, raising my concern about the suitability of this site compared to other alternatives.

In the DEIS, several alternative sites are considered. However, the information presented does not allow a quantitative comparison of the flying bird traffic among these sites. This is particularly important since Nantucket Sound is used by all of North America's endangered roseate terns, and this population could be driven extinct if the wind turbines were cited incorrectly. This would be a disaster for these birds and for the future of off-shore wind in the region.

An examination of Figure 3-20 of the DEIS shows three alternatives within Nantucket Sound proper. Even casual consideration of the bird uses, and geography, of this area should raise concerns about the potential for bird collisions in this area. However, the *South of Tuckernuck Island Alternative* (STI) is outside of the sound and appears to be a site where the rate of transiting by roseate terns and other seabirds may be considerably less. It is also further from the mainland, so migrating birds are more likely to be flying higher as they pass this site. In the preparation of the EIS, I strongly urge you to include a careful comparison of the STI site with the HSS site, allowing a solid assessment of bird traffic through the planned rotor areas of the project. Serious consideration should be given to siting the wind project at the STI alternative.

Thank you very much for considering my concerns,

Jennifer D. Nichols
25 Three Ponds Road
Wayland, MA 01778

Adams, Karen K NAE

From: SCOTT HUTCHINS [scott.hutchins@us.army.mil]
Sent: Thursday, February 24, 2005 7:33 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004496

Dear Ms. Karen Kirk-Adams:

We must stop being dependent on fossil fuels as a non-renewable energy source and focus on renewable sources. Wind is an excellent alternative and in my opinion the best choice between solar, thermal, hydro and hydrogen. It just makes sense!

Sincerely,

SCOTT HUTCHINS
55 CHURCH ST.
GRAFTON, MA 01519

cc:
Capewind

Adams, Karen K NAE

From: David Brancazio [dbrancazio@comcast.net]
Sent: Thursday, February 24, 2005 7:41 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004497

Dear Ms. Karen Kirk-Adams:

I am writing to voice my strong support for the cape Wind Project. I firmly believe that the environmental, health, economic, and even national security (i.e. working towards energy independence) benefits of this project are so crucial in this day and age that it would be a terrible loss to pass up this opportunity. I sincerely hope that decision makers such as yourself will consider its many long-term benefits to Massachusetts residents, and to Americans in general, and endorse this visionary project. I realize that requires boldness, and that is exactly what we need to construct a future that our children and future generations will thank us for, rather than suffering the consequences of our inaction.

Best Regards,

David Brancazio

Sincerely,

David Brancazio
17 Norumbega Street
Cambridge, MA 02138

cc:
Capewind

Adams, Karen K NAE

From: Allan McAlpine [amcalpin@us.ibm.com]
Sent: Thursday, February 24, 2005 7:52 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004498

Dear Ms. Karen Kirk-Adams:

Dear All Concerned,
As a Father of two (3 years and 4 years) and a lover of Cape Cod I write this. My Family has vacationed on Cape Cod since I was a little boy. My parents live there now. I have studied all the background. I observe tremendous capabilities of wind power being generated in Europe. I find it mind boggling that we all need to lobby for the new Cape Wind power generation. The renditions of the wind mills are not ugly. They are in fact wonderful and many children will find them a wonder of the world. When they grow older they will thank our generation for having the back bone to build them and crush the self serving rich people in the big homes on the beaches of the cape and islands who feel their lazy cocktail hours every day will be hurt having to look at wind mills far out in the ocean.

The world is hurting. The environment is hurting.

Please accept this letter as strong support from a concerned parent. We all need to leave our children with a cleaner, safer environment. Wind Mills are a big deal. Please build them!

Thank you,
Allan McAlpine
Senior Executive, IBM Corporation

Sincerely,

Allan McAlpine
598 Great Road
Stow, MA 01775

cc:
Capewind

Adams, Karen K NAE

From: diolmsted@verizon.net
Sent: Thursday, February 24, 2005 8:01 AM
To: Energy, Wind NAE
Subject: Nantucket Sound Windmills

004499

Dear Sirs,
While I'm all for renewable energy sources I'm against windmills in Nantucket Sound. I'm sure you heard it all before, oil spills, safety, looks, licensing etc. I would suggest that windmills might be built on lighthouse properties or other near shore properties where they would be easier and cheaper to build and maintain. Water front cities like Boston which already have a "industrial" skyline would be preferable sites in my opinion.

Regards,
David Olmsteddiolmsted@verizon.net

Adams, Karen K NAE

From: Helen Snively [info@capewind.org]
Sent: Thursday, February 24, 2005 8:04 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004500

Dear Ms. Karen Kirk-Adams:

This is just one more letter in support of Cape Wind. Of course it has some defects, but given the environmental crisis we face because of global climate change, we have no choice but to go ahead with it. Plus, won't it be great to be able to close power plants based on coal or nuclear and use wind, renewable wind?

And once again Massachusetts will be cutting edge. I love the idea.

What a great project... please support it.

Helen Snively

Sincerely,

Helen Snively
1 Fayette Park
Cambridge, MA 02139

cc:
Capewind

Adams, Karen K NAE

From: James Mavor [info@capewind.org]
Sent: Thursday, February 24, 2005 8:25 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004501

Dear Ms. Karen Kirk-Adams:

I urge you to SUPPORT the Cape Wind effort. There are downsides with the concept but it is more important to provide renewable energy in the long term for the cape and islands.

Sincerely,

James Mavor
33 Gilbert Rd
Needham, MA 02492

cc:
Capewind

Adams, Karen K NAE

From: Tod Minotti [info@capewind.org]
Sent: Thursday, February 24, 2005 8:27 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004502

Dear Ms. Karen Kirk-Adams:

Cape Wind should go forward.

Sincerely,

Tod Minotti
492 Woodstock Road
Woodstock , VT 05091

cc:
Capewind

Adams, Karen K NAE

From: Harvey Schaktman [schaktman@comcast.net]
Sent: Thursday, February 24, 2005 8:32 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004503

Dear Ms. Karen Kirk-Adams:

As a resident of Massachusetts and a father of four children I am expressing my wholehearted support for the Cape Wind project. In a time that is witnessing a backward slide in treating our energy and environmental problems seriously, the Cape Wind project is a ray of hope that reason and intelligence may prevail. Our addiction to fossil fuels have created a horrifically dangerous political environment. The successful implementation of Cape Wind may just be the event that triggers a massive investment in clean, renewable energy and an abandonment of nuclear, coal, and other poison emitting sources of energy.

Thank You for your attention,

Sincerely,

Harvey Schaktman
22 Bridge Street
Shelburne Falls, MA 01370

cc:
Capewind

Adams, Karen K NAE

From: CATN09@aol.com
Sent: Thursday, February 24, 2005 8:40 AM
To: Energy, Wind NAE
Subject: wind farm

004504

Dear Karen Kirk Adams,

I am writing this letter to acknowledge my support of the proposed wind farm in Nantucket Sound. I am a home owner and have been a year round resident for 15 years in Waquoit, a village in East Falmouth.

When I was growing up my grandparents had a summer home in South Chatham. It was on a Marsh near Forest Beach. Every few years now I go down to where the old house was just to remember my childhood. The house they owned has been torn down and an enormous house has been built on the lot. It overlooks a creek. The marsh, that is in view from this house is a beautiful untouched spot at this point, but it wasn't always that way. All the years we were growing up it was full of radio towers that have now been removed. I remember being up close to those radio towers, their many stranded cables wrapped and taut rising up to the sky. They were, in a way, majestic, and certainly my grandmother thought so. She was always proud that those towers were out there. They had been an important way to radio messages during the war to ships. My grandmother felt that manmade things had a beauty when they were coupled with a value that was important to the well being of the citizens of this country.

I will look with pride out at wind towers in Nantucket Sound, should they be built there. They will be a gift to the world when they preserve oil and harness a pollution free power source.

Virginia Stewart

Adams, Karen K NAE

From: Katy Freytag [kfreytag@gordonschool.org]
Sent: Thursday, February 24, 2005 8:45 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004505

Dear Ms. Karen Kirk-Adams:

I am in support of the Cape Wind Project. It is your duty to give alternative energy a chance. Wind power is a clean engergy source. I urge you to allow Cape Wind to supply some of our energy needs.
Sincerely,
Katy Freytag

Sincerely,

Katy Freytag
63 Massasoit Ave.
Barreington, RI 02806

cc:
Capewind

Adams, Karen K NAE

004506

From: GEORGE COYNE [GCOYNE@delex.com]
Sent: Thursday, February 24, 2005 8:56 AM
To: Energy, Wind NAE
Subject: COMMENTS ON US ARMY CORPS OF ENGINEERS REVIEW OF PROPOSED WIND FARM

As one who has spent every summer on Cape Cod, and a property owner there, I am completely opposed to the proposed wind farm. I have sailed out to the so-called test tower several times. This monstrosity has no place in the historic and scenic Nantucket Sound. To add many more larger wind turbines changes the Sound into an industrial wasteland. It is my opinion the Corps' review was not conducted as a disinterested, legal, and scientific review, but instead, was heavily biased in support for the project. It is interesting to note how strongly the Corps comes down on anybody that wants to even touch one square finch of so-called wetlands, but here the Corps is giving away a whole sound and recklessly ruining the entire environment.

The Corps of Engineers has already had significant bad press in Washington in the way it has conducted itself in the past. It appears its members have not learned anything from it.

George K. Coyne Jr.
Captain U.S. Navy (Ret)
~~~~~~~~~~~~~~~~~~~~~~~~
George K. Coyne
Phone & fax (703) 780-8113
~~~~~~~~~~~~~~~~~~~~~~~~

Adams, Karen K NAE

From: Peter Buck [peter.buck@eds.com]
Sent: Thursday, February 24, 2005 8:59 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004507

Dear Ms. Karen Kirk-Adams:

Please support the Cape Wind project.
- The Environmental Impact Study (EIS) has been exhaustive and has found no major impediment.
- The energy generated will offset a similar amount of coal-fired generation for a net reduction in pollution and greenhouse gas emissions.
- There is no evidence for property value reductions from (barely visible) turbines, and tourism will likely be enhanced as visitors will wish to see the turbines close up.
- Contrary to claims, the project is likely to provide a net increase in jobs, and substantial additional tax revenues for host communities.

Sincerely,

Peter Buck
4901 Pole Rd
Alexandria, VA 223091727

cc:
Capewind

Adams, Karen K NAE

From: Christopher Huston [info@capewind.org]
Sent: Thursday, February 24, 2005 9:00 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004508

Dear Ms. Karen Kirk-Adams:

The Cape Wind project must be considered as the most viable means to provide clean, renewable energy reducing our current overwhelming dependence on fossil fuels. This clean source of energy simply makes good sense. Along with the development of photovoltaic cells, wind energy has the potential to significantly contribute to our future energy needs.

The Cape Wind Farm's proposed location on Horseshoe Shoal in Nantucket Sound is a logical installation of wind power because its distance from the shore will minimize any perceived visual impact. The image of mast like structures off shore is actually appealing, particularly considering that the masts are creating energy. As a practicing architect and LEED Acredited Professional, I am certain that this project will be successful as both an aesthetic solution and a pragmatic response to a desparate need. Recreational activity will remain as it had prior to the installation of the turbines and no adverse effect on the ecosystem wil occur as a result of the wind turbines.

For the future of our children and for the independence of our country's energy sources, we need to approve the Cape Wind Farm project as a model for other locations throughout our country, both offshore and on land. Please consider these hopeful comments as we look towards the future.

Sincerely,

Christopher Huston
3689 Maple Street
Waltham, VT 05491

cc:
Capewind

Adams, Karen K NAE

From: Eric Levy [info@capewind.org]
Sent: Thursday, February 24, 2005 9:00 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004509

Dear Ms. Karen Kirk-Adams:

Dear Person
Please allow the Wind Farm project to continue: it is the direction of the future in the now. Clean energy. Go for it!
Thanks,
Eric Levy

Sincerely,

Eric Levy
28 Juniper Lane
Harwich, MA 02645

cc:
Capewind

Adams, Karen K NAE

From: Stephen Moore [smoore@mds-bos.com]
Sent: Thursday, February 24, 2005 9:06 AM
To: Energy, Wind NAE
Cc: mepa@state.ma.us; tmurray@senate.state.ma.us; stephen.lynch@mail.house.gov
Subject: Cape Wind

004510

Ms. Kirk-Adams, Secretary Herzfelder, State Senator Therese Murray, Representitive Stephen Lynch,

This letter is being written in support of the Cape Wind project. I have been on board with this project from its very beginning. Jim Gordon gave a lecture to the members of the Boston Society of Architects - Committee On the Environment, of which I am a member, and the fledging idea of bringing wind energy to the shores of Massachusetts. I was at that lecture and was truly encouraged that such an idea had a firm foundation of data and precedence.

Years later as we stand on the cusp of true progress on many fronts, we all must throw our support towards projects with the vision of a Cape Wind. It stands to strengthen our nation from many avenues. Many other nations have been using wind energy farms off shore for a long time. Even our state of Massachusetts has had success in shoreline wind energy, in Hull, MA. The success of the Hull Wind turbine has led to discussion on expanding the number of turbines there. The fact that there can be a discussion of furthering a successful venture is a testament to the citizens commitment to sound policy.

"In New England, an overwhelming amount of our electricity (over 80%), comes from polluting fossil fuel and nuclear power resources, causing significant harm to both the environment and public health. And less than 1% comes from wind and solar combined." (from the Mass Energy Consumer Alliance website) For those of us who have lobbied hard both locally and nationally to reduce our dependence on foreign sources of energy (for all the obvious and not so obvious reasons such as security both home and abroad) as well as reducing our harmful impact on the HABITAT that we, as human beings, effect everyday, we are eager to throw our support behind progressive ideas that are truly win-wins for the citizens and the government. Renewable energy resources are not some far-off idea. They are a clear and present need, and one that should be implemented appropriately.

Sincerely,

Stephen Moore

11 Bernice Avenue
Brockton, MA 02301
smoore_arch@msn.com

C.C.: Senator John Kerry, Senator Ted Kennedy, Governor Mitt Romney

Adams, Karen K NAE

From: Katherine L. Scott [kscott@cape.com]
Sent: Thursday, February 24, 2005 8:47 AM
To: Energy, Wind NAE
Cc: comments@saveoursound.org
Subject: NAE-2004-338-1: Cape Wind Proposal

004511

Dear Ms. Kirk-Adams: I would appreciate a confirmation that you have received this transmission as a commentary from the public on NAE-2004-338-1: Cape Wind Proposal, which I am sending at 9:15 a.m., February 24. Thank you.

Yours sincerely,
Katherine Scott
Falmouth, Mass.
(508) 540-8665; kscott@cape.com

Dear US Army Corps of Engineers: Last February the comments of mine at the end of this letter were published the Cape Cod Times. In addition to those comments, I would like to submit the following points for inclusion in the official record of public commentary to Cape Wind's proposal to erect a power plant in Nantucket Sound consisting of 130 large wind turbines:

I support the proposal put forward by Reps. Turkington and O'Leary to call a moratorium of at least a year on making a binding decision concerning Cape Wind□s application for permits to construct a power plant in Nantucket Sound.

I object to the project as currently conceived, and to the process whereby permits may be given out before all the project□s ramifications have been adequately discussed and understood. Quite apart from outstanding environmental and navigation issues, I question the wisdom of the Cape Wind project primarily from a business and commonsense point of view.

1. Wind is a relatively low-intensity energy source (compared to, e.g., fossil-fuel energy, hydroelectric power, ocean energy). Does the low intensity of the energy source justify the high-input, high-overhead, multi-acreage plant installation, which seems to follow the centralized-energy-generation model of high-intensity energy sources? It may be more logical to disperse energy generation capacity from wind over multiple smaller installations, for example, on a municipal basis, as in Hull (and as planned in Falmouth) and to distribute directly to local end-users.

2. Has it been demonstrated that the Cape Wind power plant project is genuinely "sustainable," in the original sense of this word? Will it yield more energy than that used to construct the plant? In other words, will it yield net energy, more energy than all the energy inputs required to build and run it? ALL the energy inputs required to plan, construct, erect, and maintain the turbines and distribute the energy generated must be counted. I have read that we now use 10 calories to produce one food calorie on the grocery store shelf; it may be that more than one kilowatt is needed in inputs to produce one kilowatt from wind from a large installation such as that proposed. Does the Nantucket Sound Wind Power Plant pass this basic energy-accounting sustainability test.

3. Is there any guarantee that Cape Wind will stay around to manage the power plant once the company has harvested the available government subsidies for "green" energy?

4. If we are worried about terrorists attacking us here on Cape Cod--and apparently we are, judging by the measures that the Steamship Authority is obliged to take--is it sensible to put an outlying element of our national electricity grid offshore, where it is vulnerable to and perhaps even a magnet for attack? Will it need to be watched and guarded? Could all or part of the area eventually become a military "no-go" zone, a la Otis and Noman's Land?

5. Does the Cape Wind Power Plant proposal represent a genuine positive value to the public and especially the residents of Cape Cod as a source of cheaper, low-impact energy, or does its prime value reside in its being a feel-good symbol of our collective good intentions vis-a-vis energy policy, one that does not require that we actually rethink and change our patterns of energy generation, distribution, and use?

Cape Wind□s application for permits to install a power plant in Nantucket Sound should be seen as a wake-up call to the region, the Cape and Islands region at the least, and the whole New England region at the best.

The Cape Wind proposal has filled the planning vacuum and has in a sense become the only alternative-energy plan on the horizon.

The idea of placing 130 turbines in Nantucket Sound is in itself not a strategic plan. Cape Wind is not a planning body. The U.S. Army Corps of Engineers is not a planning body. We must not--we cannot--wait for someone else to do our planning for us. The money and the initiative are not going to come from anywhere else besides ourselves. We have the brains here on the Cape and in Massachusetts. We must act in our own behalf and that of the nation to start a genuine energy planning process.

I urge the Cape Cod Commission and the Martha□s Vineyard Commission to work with other planning bodies, including the Cape Light Compact, to develop a genuine strategic energy plan incorporating the features we wish to see: local control and local benefits, aggressive conservation and energy accounting, efficient distribution, sensible deployment of technologies according to the intensity of the energy source, and the development of new technologies such as electricity from higher-intensity sources--waves, currents, and tides. Only within the context of such planning can the true benefits and downsides of Cape Wind□s proposal--the necessity of the Nantucket Sound power plant--be assessed and convincing arguments made either FOR the proposal or AGAINST it and FOR something else.

Yours truly,
Katherine Scott
129 Hamlin Avenue
Falmouth, Mass. 02540

Can we live in harmony with wind farms?

Public ownership would ease many wind energy concerns

From the Cape Cod Times, February 1, 2004
By Katherine Scott
How ironic that corporate energy interests have been allowed to define the debate about the Nantucket Sound wind power installation: If you are for renewable energy you have to be for the Cape Wind Associates' mega-project, and if you oppose it you must have NIMBY syndrome or not be a real environmentalist.

Then some arrows from both pro and con quivers are loosed at people who drive SUVs. Meanwhile people in both camps drive SUVs

One reason we are having so much trouble grappling with this project is that we are dealing with a corporate entity we distrust and a deregulatory environment that seems tailor-made to suit wildcat energy brokers.

Many people object to the idea that public space - Nantucket Sound - should be developed by a private corporation that will "harvest" the renewables in our own "oil patch," and then sell the power back to us, the price to be negotiated. Furthermore, energy conservation seems to play little role in the development of corporate renewables.

What is good for the bottom line of private developers - energy brokers such as Enron and their investors - may not be the best deal that can be made for the public and the environment. If there is money to be made in renewables - in energy generally - why shouldn't communities make it? One way for Cape communities to gain decision-making and planning control of their energy future would be to form a publicly owned utility (POU).

Many Americans don't realize that there are 2,000 publicly-owned power companies in this country. Most of the rest are investor-owned utilities (IOUs). The chief difference between IOUs and POUs is that the former exist to make money for investors, whereas the latter are not-for-profits that exist to provide electricity efficiently and inexpensively to consumers.

According to the American Public Power Association, IOUs charged 20 percent more than POUs in 2001. Furthermore, California's 2001 rolling blackout and price-gouging nightmare didn't impact cities with POUs, such as Los Angeles and Sacramento. In fact, a number of communities that have initiated the process to create POUs have done so in response to that mess, and also deteriorated distribution lines and outages. Sound familiar?

From the APPA's web site (www.appanet.org) you can find out who their members are (about 40, including Braintree and Taunton, are in Massachusetts); what the process is whereby communities and regions create a POU; what the advantages (now enjoyed by 15 percent of Americans) of a POU are to consumers, businesses, and municipalities; and how diverse the member utilities are.

Here on the Cape and Islands we are fortunate to have the Cape Light Compact (www.capelightcompact.org), which with its aggregated buying power has achieved significant savings for the Cape and islands. The next step might be to become not just a purchaser of energy but a full-fledged publicly owned regional utility - one with the right to develop the Cape's renewable resources, distribute the power, and sell the excess, all for the benefit of Cape and islands consumers, businesses, and municipalities.

A major undertaking indeed, but let's imagine that our own POU - let's call it the Cape and Islands Power Authority (CIPA) - was managing our energy distribution network and had applied for and been given the permits to place wind turbines in Nantucket Sound.

Once you posit local control, many issues - conservation, scale of projects, tradeoffs concerning aesthetics, and genuine long-term energy planning - fall into place in a different pattern, a more attractive one. All of these issues are related and impact one another. Once CIPA is in charge, the basic picture, as I see it, is this:
1. Local planning targets energy self-sufficiency for Cape and islands and emphasizes a mosaic of renewable technologies and scales. There would be community-based conservation accounting of decrease in fossil fuel-based watts and BTUs consumed and renewables-based watts and BTUs created. Conservation is still the cheapest source of energy. A watt saved is a watt earned. (Furthermore, a watt saved is a penny not earned by corporate shareholders.).

2. The decision to emplace wind turbines is made locally. Towers may be erected on an incremental basis, for ongoing evaluation. CIPA, not a private developer, partners with private technology companies to plan and run the project. Profits flow to the communities in the form of lower rates. Excess power is sold to create an income stream. Any large installation will be under the control of the CIPA and plans for decommissioning and removal are already in place when towers are built because unsightly wind turbines are a transitional technology based on a low-intensity energy source.

3. Longer-term planning focuses on and fosters in-the-pipeline technologies: improved conservation and less intrusive, more efficient renewables technologies. Here the elephant in the corner is the ocean-potentially the most powerful renewable energy source of all. Oddly, ocean energy has remained largely under the radar for renewables mavens in this country. Go to http://www.capecodmedia.com/ccttoday.php?sid=18 5 for a good account of some local ocean-energy initiatives.

In summary:

The wind turbine array may be acceptable to the Cape and Islands community if it is under local control and benefits flow to the region; if it is planned as part of an overall energy plan emphasizing conservation and multiple types of renewables; and if it is understood as just one phase of a long-range plan to remain in the forefront of responsible energy policy and to lead by creating an innovative business model.

Katherine Scott is a freelance editor and writer and longtime environmental activist who has written on various conservation and land-use topics. She grew up on Martha's Vineyard and is a resident of Falmouth

BACK TO TOP

Adams, Karen K NAE

From: Sue Rohrbach [srohrbach@comcast.net]
Sent: Thursday, February 24, 2005 9:22 AM
To: Energy, Wind NAE
Subject: Cape Wind proposal

004512

Comments re the Cape Wind proposal for Nantucket Sound:

I urge you to reject Cape Wind's proposal. The information that they have submitted is both inadequate and slanted, despite their public relations campaign to persuade the public to the contrary. The information presented seems to be only that that supports the application, rather than being the kind of balanced document that would be needed to make a good decision. I have many concerns about aesthetics, both noise and lighting, and a number of economic concerns. It is still not at all clear what the true costs of the electricity created by these wind towers would be, and I suspect that it is very high. Given that there is "nowhere" else that wind towers can go, it seems an extremely expensive experiment with no other applications--one whose detriments outweigh its benefits. Please send this proposal back to its makers, either permanently, or for MUCH further study and full information.

Susan Rohrbach
432 Main Street
Centerville, MA 02632

Meg Wilcox
67 Eastland Rd
Jamaica Plain, MA 02130 004513

February 24, 2005

Karen Kirk Adams
Cape Wind Energy Project
EIS Project Manager
Corps of Engineers, New England District
By e-mail: wind.energy@usace.army.mil

Dear Ms. Adams:

I am writing to support the draft Environmental Impact Statement that your office issued several months ago for the Cape Wind Project, and to suggest that you complete a final EIS expeditiously so that this important project can go forward.

The draft Environmental Impact Statement indicates that there will be no impacts from Cape Wind on aquatic life, including protected marine mammals; minimal impacts on commercial fishing and recreational boating; and a relatively small number of bird kills per year. The only concern about Cape Wind appears to be visual aesthetics.

In contrast, the benefits of Cape Wind far outweigh its negatives. Perhaps the most important benefit of Cape Wind is that it will reduce carbon dioxide emissions, the main cause of global warming, by more than one million tons per year, making it the single greatest contribution to preventing climate change in New England.

Recent studies show we have a rapidly narrowing window of time—perhaps only a decade—to take serious action to cut carbon emissions, in order to prevent climate catastrophe in this century. At a meeting convened by Prime Minister Tony Blair in Exeter, England three weeks ago, 200 climate experts concurred with that bleak assessment. In *Meeting the Climate Challenge*, climate experts state that 400 parts per million (ppm) carbon dioxide is the danger point, a point beyond which temperature rise could cause disastrous changes, such as widespread agricultural failure, water shortages and major droughts, the death of forests, the melting of the Greenland ice sheet (and rapid sea level rise), or the switching off of the Gulf Stream. At a current carbon level of 379 ppm, we are racing a ticking clock and simply cannot afford to delay on implementing critical renewable energy projects such as Cape Wind.

As Dr. James E. Hansen, a climate scientist and director of NASA's Goddard Institute for Space Studies, said recently "I think that the scientific evidence now warrants a new sense of urgency."

But Cape Wind also has a myriad of other benefits, including reducing air pollution, improving public health, creating new jobs, reducing our dependency on foreign oil and even stimulating tourism.

By substantially reducing the use of fossil-fuel power plants serving Cape Cod, the wind park would cut annual air pollution by about 448 tons of particulates, 120 tons of carbon monoxide, 4,642 tons of sulfur dioxide, and 1,566 tons of nitrous oxides, along with several hundred pounds of toxics such as mercury. It would help Massachusetts achieve attainment for ozone. The monetary savings estimated to result from this reduction in air pollution, due to reduced deaths and illness from respiratory ailments, is a staggering $53 million per year.

As a public health professional, and a mother of two children (ages 8 and 5) with asthma, it is difficult to fathom why a non-polluting, renewable energy source such as Cape Wind would be rejected in favor of dirty fossil fuels. Asthma is an epidemic among young children and its link to air pollution is well established.

Cape Wind would also have economic benefits, first by creating approximately 154 new jobs once the wind park is operational (and 391 during construction). Second, according to the state's Energy Facilities Siting Board, the downward pressure Cape Wind would put on electricity prices would save New England customers about $25 million a year, with $10 million of that being saved by Massachusetts customers. Cape Wind will also reduce our dangerous reliance on imported fossil fuels, with their volatile pricing. And, by helping to spark the renewable energy revolution that the country so desperately needs, the wind park will help keep American businesses competitive with European and Asian businesses that are already innovating to meet the global warming challenge.

Finally, I would like to comment on visual aesthetics. I know that Cape Cod is a special place because it is a second home to me. My parents own a house in Wellfleet. To me one of the most beautiful spots on Cape Cod is the Massachusetts Audubon Sanctuary in Wellfleet; and yet, if Wellfleet harbor had been chosen as the location for the wind park I would not object. Instead I would welcome the wind turbines with open arms because the sight of them fills me with hope for humanity—hope that somehow we will pull together to make the difficult leap to sustainable living and a brighter future for our children.

As a society, we have to make crucial decisions regarding where we get our energy. Every form of energy has its price, and with Cape Wind the price is the view. The price of the alternatives is much worse and has historically fallen on those who don't have the resources or political connections to fight back. With global warming we are all paying the price of our continued reliance on fossil fuels. It would be wrong to reject the wind for concerns about visual aesthetics.

For all these reasons, I urge the Army Corps to give its approval to the Cape Wind Project.

Yours truly,

Meg Wilcox

Adams, Karen K NAE

From: Karen Carmean [carmean2@yahoo.com]
Sent: Thursday, February 24, 2005 9:18 AM
To: Energy, Wind NAE
Subject: Why we support Cape Wind Project

Re: The Cape Wind Project

We'd like to voice our support in favor of the Cape Wind Farm -- a project that is critical to the people of Massachusetts – and to a greater extent, the people of this country. From an environmental, health and economic standpoint, this project makes sense.

004514

First and foremost, this is an opportunity to significantly improve the environment of New England by harnessing the power of what will be one of the largest sources of clean renewable energy in the northeast. Cape Wind would produce about three-quarters of the electrical needs of Cape Cod, Martha's Vineyard, and Nantucket, or about 1% of electricity use in New England.* By adopting this clean source of power, we'd be taking marked strides in reducing the problems of fossil fuel emissions that lead to the devastating environmental effects such as global climate change. The fact is that if we do not seize this opportunity, the result will be more of the same – and with the specter of global warming threatening to submerge the beaches in Massachusetts, reduce the fall and ski season -- this state doesn't have the luxury to cling to the status quo.

The Cape Wind Project is not only necessary for the environment, it makes good economic sense. According to the state's Energy Facilities Siting Board, by putting downward pressure on electricity prices Cape Wind would save consumers in New England about $25 million a year, with $10 million of that being save by Massachusetts consumers.* Just imagine what that extra money that could be used for?

We've already talked a bit about the environmental and economic benefits, but the direct impact on the health and welfare of the people of Massachusetts is critically important. In fact, according to analysts used by the EPA, fossil fuel power plants in Massachusetts are responsible for over 300 premature deaths, over 700 heart attacks, over 8,000 asthma attacks each year due to harmful emissions from their smokestacks.* So when people complain about the risks of venturing into this uncharted territory, We'd like to challenge them by saying that the risk of not changing is far too great to ignore.

Naturally finding new ways of doing things always raises questions. For example, although many people find wind turbines to be elegant in design, others have raised concern about their aesthetics. And while we understand their concern, the project's distant location several miles offshore will reduce the visual impact of the wind turbines. Additionally, the project will not be erected without input regarding the design. In fact, the regulatory review requires Cape Wind to prepare several precise and scientific visual renditions from various vantage points and Cape Wind will make these renditions publicly available once they have been prepared.*

So we now have a chance in the state of Massachusetts to be a leading example of responsible change for the rest of the nation. We know that something must be done to halt and reverse the devastating effects of global warming, and with the Cape Wind Project, we now have a smart alternative for the large scale production of renewable energy. Although nothing will ever be the perfect solution, the Cape Wind Project is a good start.

In the end, we are all striving for the same goal: we all want the health, economy and environment of this state to be stronger and more vital. And I believe that with the advent of the Cape Wind Project our goal is finally in sight.

Sincerely,

Susanne Norwitz
Leith Sharp
John Francis
Rosalie Anders
Karen Carmean
Tom Montagno
Michael Hanlon
Janet Burns
Grenelle Scott
Louise Weed
Roger Frymire
David Davis

Adams, Karen K NAE

From: MARCIA CHAPMAN [moshchapman@yahoo.com]
Sent: Thursday, February 24, 2005 9:21 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004515

Dear Ms. Karen Kirk-Adams:

I am a Cape resident who supports the Nantucket Sound wind farm.

Sincerely,

MARCIA CHAPMAN
28 SADYS LN
EAST FALMOUTH, MA 02536-6261

cc:
Capewind

Adams, Karen K NAE

From: KEITH CHAPOMAN [keithchapman28@yahoo.com]
Sent: Thursday, February 24, 2005 9:23 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

I AM A RESIDENT OF CAPE COD, A BOATER & A FISHERMAN & I SUPPORT CAPE WIND.

004516

Sincerely,

KEITH CHAPOMAN
28 SADYS LN
EAST FALMOUTH, MA 02536-6261

cc:
Capewind

Adams, Karen K NAE

From: Steven Charleston [Scharleston@eds.edu]
Sent: Thursday, February 24, 2005 9:50 AM
To: Energy, Wind NAE
Subject: Cape Wind Project

004517

Dear Ms. Adams:

I am writing to offer my strong support for the Cape Wind project. I believe it is a vital part of our Commonwealth's efforts to protect our environment while providing clean energy. Thank you so adding my name to the list of those favoring this initiative.

Sincerely,

+Steven Charleston

The Rt. Rev. Steven Charleston
President and Dean
Episcopal Divinity School
99 Brattle Street
Cambridge, Massachusetts 02138
617-682-1511 (new)
scharleston@eds.edu (new)
www.eds.edu

Adams, Karen K NAE

From: Michael Phillips [mphillips@eds.edu]
Sent: Thursday, February 24, 2005 9:56 AM
To: Energy, Wind NAE; mepa@state.ma.us
Subject: Cape Wind Project

004518

I would like to add my voice to those who are in support of the Cape Wind Project. This important initiative in renewable, non-fossil-fuel energy is of great importance, especially given its low impact on marine life. The benefits of this far outweigh any negative visual impact for those who might see it in the distance or from boats. Massachusetts is a Commonwealth. Let's put the emphasis on the first half that designation, not the second.

Br. Michael Phillips
Executive Assistant to the President and Dean
Episcopal Divinity School
99 Brattle Street, Cambridge, MA 02138
617-682-1511 mphillips@eds.edu

"At the last judgement, I will not be asked whether I satisfactorily practiced asceticism, nor how many prostrations and bows I have made before the Holy Table. I will be asked whether I fed the hungry, clothed the naked, visited the sick and the prisoner in jail. That is all I will be asked."
--Saint Maria Skobtsova,
executed Good Friday, 1945, Ravensbruck Concentration Camp, for sheltering and assisting Jews in Paris

Adams, Karen K NAE

From: lslap@EdwardsAngell.com
Sent: Thursday, February 24, 2005 9:57 AM
To: marc@mbreslow.org
Cc: Energy, Wind NAE; mepa@state.ma.us; scharleston@eds.edu
Subject: Cape Wind Project

004519

I fully endorse the Cape Wind Project. The benefits to our environment and to lessening our reliance on foreign supplies of energy make proceeding with the project a matter of both environmental justice and national security. How often do those two interests coincide so smoothly?

Best regards,

Lee Slap
Belmont, Mass.

Boston, Ft. Lauderdale, Hartford, New York, Providence, Short Hills NJ, Stamford, West Palm Beach, Wilmington, London (Representative office)

Adams, Karen K NAE

From: George Williams [gwilliams@eds.edu]
Sent: Thursday, February 24, 2005 10:01 AM
To: Energy, Wind NAE
Cc: mepa@state.ma.us
Subject: Cape wind mill coments

004520

Dear Sirs,

I support the Cape windmill project for clean source of energy supply. I am, however, concerned with the possibility of loss of natural life due to this: i.e. fish, birds, shells.

Sincerly,
George Williams

George R. Williams
Director of Food Service
Episcopal Divinity School
99 Brattle Street
Cambridge, MA 02138
Phone: (617) 682 1555(new)
Toll Free: 1-866 433-7669
Fax: (617) 864-5385
E-mail: gwilliams@eds.edu
Website: www.eds.edu
"Mercy, peace and love be yours in abundence" Jude:2

Adams, Karen K NAE

From: Sara Schley [seedsara@aol.com]
Sent: Thursday, February 24, 2005 9:48 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004521

As supporters of sustainable development and a progressive energy policy, we strongly support the Cape Wind project. Wind is crucial in the mix to get the United States off of our dependence on foreign petroleum. We urge you to support Cape Wind.

Sara Schley and Joe Laur
Senior Partners and Stewards
SoL Sustainability Consortium

Sincerely,

Sara Schley
313 FArley Rd
Wendell, MA 01379

cc:
Capewind

Adams, Karen K NAE

From: David Farrell [farrellsealaw.org]
Sent: Thursday, February 24, 2005 10:07 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004522

Dear Ms. Karen Kirk-Adams:

As a maritime lawyer based in Chatham, I have examined the pros and cons over the last several years and strongly support the Cape Wind project. I do not believe there will be significant fishery or navigation disruption and view the opposition as NIMBYs.

Very truly yours,

Admiralty Law Office of
David J. Farrell, Jr.

Sincerely,

David Farrell
2355 Main Street
PO Box 186
S Chatham, MA 02659

cc:
Capewind

Adams, Karen K NAE

From: Martha Gillette [mcgillette@mac.com]
Sent: Thursday, February 24, 2005 10:07 AM
To: Energy, Wind NAE; mepa@state.ma.us
Cc: marc@mbreslow.org
Subject: Cape Wind Effort

004523

With all the time, money, effort, and resources we devote to conceiving and executing projects that denigrate the quality of our environment, I would like to think we could at least occasionally turn our attention to an initiative that was inherently constructive rather than ultimately destructive. I would like to add my name to the list of those who endorse and support the Cape Wind effort.

M. C. Gillette, CAPT, USN (Ret.)
Episcopal Divinity School,
Cambridge, MA 02138

Adams, Karen K NAE

From: Dorothy DeYoung [ddeyoung@bso.org]
Sent: Thursday, February 24, 2005 10:09 AM
To: Energy, Wind NAE
Subject: Windmills in Nantucket Sound

004524

Very rarely does a human being have the responsibility to affect the environment in a way you currently do. I hope you realize how awesome the task before you is. I totally support alternative energy sources and lament the governments lack of support. Giving a private company free access to Nantucket Sound at the cost of environment makes no sense. Why would anyone be in favor of this project other than the developers? Once the Sound is destroyed it can't be replaced.

Adams, Karen K NAE

From: Ann Franklin [AFranklin@eds.edu]

Sent: Thursday, February 24, 2005 10:36 AM

To: Energy, Wind NAE

004525

Karen Kirk Adams
Corps of Engineers
Concord, MA
Dear Ms. Kirk Adams:
This is to urge approval of the Cape Wind project.
This project will protect and provide for us for generations to come. I have studied energy alternatives since 1975. The Cape Wind project could be a model for communities who want to invest in the quality of life in practical, sustainable ways, now and into the future. Seize the opportunity to lead the way.
Sincerely,
Ann Franklin

The Rev. Ann H. Franklin
Director, Annual Fund
Episcopal Divinity School
617.682.1512

Adams, Karen K NAE

From: NCANat@aol.com

Sent: Thursday, February 24, 2005 10:37 AM

To: Energy, Wind NAE

Subject: in favor of Nantucket Wind Farm project

004526

I'm a resident of Natick Massachusetts and US citizen. I am very concerned about global warming. Capturing the energy in wind is one way to reduce the use of fossil fuel which contributes to global warming.

Nancy Amstutz
10 Oakridge Ave
Natick, Ma 01760

Adams, Karen K NAE

From: James A. Poss [jim@seahorsepower.com]

Sent: Thursday, February 24, 2005 10:52 AM

To: Energy, Wind NAE

Subject: Energy Options

004527

There seem to be only 3 viable options for energy in Massachusetts:

1) Wind power
2) Fossil Fuel or Nuclear
3) Don't use energy

Since #2 creates serious public health problems and #3 is completely unrealistic, I see no choice but to allow the Cape Wind plant. It is the most viable clean energy plan in the Commonwealth. Please weigh the options and make a favorable determination on behalf of Cape Wind.

I am voting three times: once for me, once for my children and a third time for my grand children.

Thank you for your time,

James A. Poss
President and CEO
Seahorse Power Company
jim@seahorsepower.com
www.seahorsepower.com
Tel. (617) 901-3454
Fax. (309) 439-1415

GREENPEACE

702 H Street, NW, Suite 300, Washington, DC 20001
Tel: 202-462-1177 • Fax: 202-462-4507
1-800-326-0959 • www.greenpeaceusa.org

Ms. Karen Kirk Adams
Cape Wind Energy Project EIS Project Manager
Corps of Engineers, New England District
696 Virginia Road
Concord, MA 01742-2751

004528

Re: Final Comments on the Cape Wind Project Draft EIS
Cape Wind Project File no. NAE-2004-338-1

Dear Ms. Adams:

We write to support your effort to ensure that the Cape Wind project receives due consideration in a timely manner and that the many positive attributes of the project are given adequate consideration in the Final EIS.

We believe that offshore wind offers an immediate, clean, safe and effective answer to both global warming and energy security. By its very nature wind is indigenous and limitless. It is a completely safe and resilient energy supply, not dependent on uncertain fuel supplies or rising energy prices.

Given the stark urgency of global warming, Greenpeace believes that the presumption should always be in favor of renewable energy projects, unless there is specific evidence of environmental harm. The November draft environmental impact statement (DIES) has, in our opinion, done a thorough job of surveying the potential harm to wildlife and the Nantucket Sound ecosystem and identified no major "red flags". We advise that the Army Corps weigh continued suggestions of potential environmental harm accordingly, with an open mind, thoughtful analysis and response, balanced with the understanding that many of these objections are a smoke screen from those parties who want to see the project cancelled for aesthetic or personal reasons.

The DEIS indicates that one million tons of carbon dioxide will be offset by this project every year. We suggest that in the Final EIS you further document the benefits of this project within the context of the commitments that the State has made to global warming gas reductions. For example, the Cape Wind project will be a huge step toward meeting the goals that the State has set out under the Climate Change Action Plan in 2001.

Greenpeace has been at the center of offshore wind development in Europe over the past decade. We have closely monitored offshore projects in Denmark, the United Kingdom and Germany. While these governments have put in place various supports for offshore wind power to stimulate its development, our government, State and Federal, have thus far failed to do so. In each of these countries, these projects have each raised a similar debate to the discussion around the Cape Wind project. The ecological concerns raised by wind power skeptics in Europe have not born out and we do not expect the concerns raised in the United States to endure either.

We have a 30+ year history of protecting the world's oceans from dumping, over fishing and other exploitation. As such, we did not take our decision to support the Cape Wind farm lightly. It is also our belief, backed by studies of this and other offshore wind projects in Europe, that any environmental impacts caused by installing these turbines offshore are minor, especially when compared to the truly profound impacts of global warming on the oceans, estuaries and coastal lands. From the melting ice pack of the polar regions to the bleached coral reefs of the tropics to the disruption of ocean currents, global warming is already directly harming ocean ecosystems.

Now is the time to take every action available to slow the impacts of global warming. In fact we should have started long ago. Offshore wind is a big step in the right direction and can contribute quickly to a tangible reduction in global warming pollution. In addition, as you have calculated in the DEIS, the avoided pollution and health impacts from coal and oil plants and the inherent risk of nuclear power make wind power the picture of true social progress. From local jobs to clean energy, this project is right for America and right for the Cape. In years to come, the people of Massachusetts will be proud of this contribution to the clean energy revolution.

John Coequyt
Energy Policy Specialist
Greenpeace USA

Cc: Secretary Ellen Roy Herzfelder, MEPA
Cc: Phil Dascombe, Cape Cod Commission

Adams, Karen K NAE

From: Bernadette Buck [bernadettebuck@hotmail.com]
Sent: Thursday, February 24, 2005 10:45 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004529

I am writing to support the Cape Wind project planned for Nantucket Sound. As we confront with growing unease the threat of global climate change, we must do everything we can now to wean ourselves from fossil fuel energy generation. The Cape Wind project will be a major energy producer for our region. We need a project of this size and scope as soon as possible to show that offshore wind is a viable and valuable addition to our energy mix.

While I am aware of the aesthetic concerns some people have, I am confident that once built the towers will not be nearly so intrusive as people fear. I believe many people, if not most, will find them in reality to be quite impressive, if not beautiful.

I request you do everything you can to move the project forward.

Sincerely,

Bernadette Buck

Sincerely,

Bernadette Buck
70 Pine Street
South Easton, MA 02375

cc:
Capewind

Adams, Karen K NAE

From: Charles Rohrbach [crohrbach@comcast.net]
Sent: Thursday, February 24, 2005 10:52 AM
To: Energy, Wind NAE
Subject: Cape wind farm

001530

I'm not an expert on the Cape wind farm proposal, but from what I read in the papers and hear from people from varied interests I am not convinced that it is a good idea. There seems to be a lot of down side with questionable upside. I'm a CPA and the economics are very unclear to me. I've seen many business proposals over the years and rarely do actuals come close to living up to the projections, yet investors continually place their bets with the hope of hitting that occasional homerun that pays for all the failures. In this case, a failure would largely be paid for by the residents of the Cape and Islands, yet these residents would benefit little from project success.

One argument I here is that it is necessary to do this project because there are few other suitable sites. If that is the case, then why do this project if there are few places to duplicate what is learned? In the grand scheme of things, it seems to me, the benefits from this project, even if successful, are immaterial if the project cannot be duplicated.

Please tread cautiously. Memories of the Big Dig are fresh around here.

Charles A. Rohrbach
432 Main Street
Centerville, MA 02632

Adams, Karen K NAE

From: Edward Young [ej_young@hotmail.com]
Sent: Thursday, February 24, 2005 10:53 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004531

I support the Cape Wind project. I think it is important for the US and Massachusetts in particular to put its money and political capital where its mouth is and step up to making real change towards renewable energy. The Cape Wind project is an admirable project and it is amazing it has got this far considering that the economic and political system is institutionally stacked against it. I think you should back this project not only for your constituents but for those nationally and globally who do not have a direct voice in this issue but who need the leadership of the United States in promoting renewable energy. Supporting this project has wider consequences that simply permitting the site. It will be a beacon for other projects around the US and the globe that NIMBYism can be overcome for the greater good of the environment. I urge you to support this project.

Thank you for your consideration.

Sincerely,

Edward Young
48 Tesla Avenue
Medford, MA 02155

cc:
Capewind

Adams, Karen K NAE

From: Gary Tuthill [gjt@charter.net]
Sent: Thursday, February 24, 2005 10:53 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004532

Dear Ms. Karen Kirk-Adams:

The purpose of this letter is to express my strong support for the Cape Wind renewable energy project.

Any project of this scale requires rigorous examination of risks, benefits, costs and how these are distributed. This project has undergone careful scrutiny from a variety of parties: engineers, environmentalists, economists and politicians, as well as concerned citizens. In addition to the factual merits of any proposal, politics, personal bias, and the "NIMBY" tendency are always factors in an evaluation. I'm convinced that on balance, the Cape Wind project will produce benefits far exceeding its costs.

I am in the process of building my own energy-efficient residence. Itâ€™s a timber-framed, passive solar structure designed to minimize impact on the waterfront environment in which I live. I work to reduce electric usage, and hope that as time goes on, more and more of the power supplied by the grid comes from renewable energy, including wind.

Some claim that the scale of this project is inappropriate. In terms of geographic area, its footprint is certainly larger than that of a conventional electric generating plant. However, the crucial factor is that Cape Wind's project minimizes the externalities of electric power generation which most of us conveniently ignore: mining, drilling, unstable geopolitics, even war. Enhancing public understanding of the true costs of our modern life choices is an essential step toward making safer, more sustainable ones.

From this perspective, though Cape Wind will provide only a small part of New Englandâ€™s overall electric power needs, the symbolic effect of this project can be very large. Whether one considers modern wind turbines aesthetically pleasing or not (and I happen to think that they are), they will serve directly to remind us of how the system works: in the long term, we must pay for what we use. Fossil fuel and nuclear elecric generation make it too easy to forget that.

Thus, the Cape Wind project is as important for the precedent it will set as well as for the actual electricity generated. It will mark a milestone on the road toward saner, safer, sustainable life in this great country.

Sincerely,

Gary Tuthill

Sincerely,

Gary Tuthill
73 Rocky Pond Rd
Boylston, MA 01505

cc:
Capewind

Adams, Karen K NAE

From: Chris Avis [chrisavis@msn.com]
Sent: Thursday, February 24, 2005 10:55 AM
To: Energy, Wind NAE
Subject: Wind Farm

To whom it may concern,

I don't know if you read all these letters sent in from either side of the issue, But as a registered voter in the Town of Mashpee, MA. I feel as though this projects breadth is too large for the area proposed. I feel as though economics of the positioning of the project is at work here, and personally I'm for renewable sources of energy, (solar , hydroelectric , wind).

004533

Horseshoe shoal was picked because it is realtivly shallow (I actually have walked portions of it) . It is my feeling that there is actually more wind off monomoy. Why are they not looking into positioning it where it actually is windier? Again my feeling is economics....It is cheaper to build in shallow water.

Since my tax dollars will be subsidizing this venture. I'm against it being built in one of the natural wonders. I hope my one voice will be heard.

Thanks you in advance for your time ....

Regards,

Chris Avis

Adams, Karen K NAE

From: John Costa [costaj1@asme.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004534

I am writing to encourage you to approve the Draft Environmental Impact Statement for the Cape Wind project. My reasons are described below.

I am a licensed professional mechanical engineer, and I am also the Secretary of the Providence Section of the American Society of Mechanical Engineers (ASME). At my invitation on November 9th 2004 Mark Rogers, Communications Director of Cape Wind Associates, spoke to the Providence Section of ASME about the Cape Wind Project. I was very impressed with this environmentally friendly project.

I think this is a great opportunity for the United States of America to seize the moment and initiate the development of offshore wind farms. Environmentally friendly sources of electricity are needed at this time. The Cape Wind offshore wind farm will help to clean the air, lower the generating cost of electricity, and reduce the demand for natural gas because it will take the place of older polluting generating plants that rely on fossil fuels. The current high cost of natural gas is the result of the supply of natural gas not keeping up with the demand caused by the recently built generating plants that use natural gas.

I know that wind power will not be sufficient to produce all of the electricity needs of the any region, but the United States will benefit by diversifying the source of electricity generation. For instance, if less natural gas was used to generate electricity then the cost of using natural gas to heat a home would go down because the demand for natural gas would be lowered. This is especially true in the Northeast where the Cape Wind Project will be built. This project will also help to meet the U.S. Department of Energy's goal of generating 5% of our electricity by 2020.

The amount of planning that has gone into this project proves to me that Cape Wind Associates sincerely does not want to harm the surrounding environment of Nantucket Sound. For example a single vertical support will be used for each turbine to minimize the impact on the sea floor. A wind map was shown during Mr. Roger's presentation which showed that Nantucket Sound was the best spot in the Northeast for the wind farm. The only other spot would be the mountains of New Hampshire, but it seems to me that it would be expensive to build a wind farm there.

Unfortunately the United States in the last 30 years or so has not been a world leader in renewable environmentally friendly energy production. Please do not let this opportunity pass, and approve the Draft Environmental Impact Statement for the Cape Wind project.

Sincerely,

John T. Costa P.E.

Sincerely,

John Costa
22 Carrie Ann Drive
Cranston, RI 02921

cc:
Capewind

Adams, Karen K NAE

From: Nathaniel Dummer [nnd524@yahoo.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004535

Dear Ms. Karen Kirk-Adams:

The use of the wind to drive generators to produce electric power is one of the best ways to produce energy.

It is similar to the use of falling water to produce hydroelectric power.

Both methods use no fossil fuel and are therefore clean with no waste products.

Therefore I support the Cape Wind Project and request that it be approved.

Sincerely,

Nathaniel Dummer
34 Wethersfield St.
Rowley, MA 01969

cc:
Capewind

From: Donald Finocchio [info@capewind.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004536

Dear Ms. Karen Kirk-Adams:

To ACOE:

For the sake of our country, our national security and the world environment I urge you to approve this project.

After just reading the book "Out of Gas" its clear to me that the fight for dwindling fossil fuel resources will intensify, especially with the surging demand of China. When I heard the news on September 11th that the twin towers were attacked I immediately felt it was a message that we must stop the fight for oil. Unfortunately, many if not most in our country missed that message and $200 billion later our country is looking for more recruits the age of my sons to go fight the senseless war in Iraq.

I met a laser scientist of Chinese decent, MIT trained, this weekend at a holiday party. He assured me that for $200 billion our country could develop fusion nuclear energy (which uses lasers) or just about any other technology. He went on to say that China is moving beyond fossil fuels to develop these alternative technologies and will likely pass the US in doing so.

We need the CapeWind Project. I'm an avid striped bass fisherman, a longstanding member of Mass Audubon and Essex County Greenbelt and have summered eleven years in a cottage on Sea Street Beach in Hyannis facing Horseshoe Shoals. The benefits, both energy and symbolically, of this project far outweigh the well researched impacts.

Please approve the Cape Wind Project

Sincerely,

Donald Finocchio
24 County Rd
Ipswich, MA 01938

cc:
Capewind

From: Leah Tofte-Dorr [leah@springstdigital.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Karen Kirk-Adams
696 Virginia Road
Concord, MA 01742-2752

004537

Dear Ms. Kirk-Adams:

I am writing in support of the Cape Wind offshore wind project. I believe that this project will be a great benefit to the local community. I am excited and proud that this type of alternative energy is planned in the community that I live and am raising my children.

Concerns about aesthetics seem to be the main opposition points. I do not believe that the wind turbines will have any negative affect on the view or on tourism as suggested by the opposition. I can't imagine people not coming to the island because of the sight of turbines in the distance. In fact I think that many people would find the project interesting and unique.

I believe it is our duty to seek all potential alternative power resources in a responsible manner. It is the example that we should be setting for future generations expecially in light of our country's current dependency on foreign energy. Cape Wind and the Army Corps report have shown the attention to detail and the sense of responsibility that both of these organizations feel for the environment.

Thank you for considering my comments.

Sincerely,

Adams, Karen K NAE

From: Naomi Tina Segal [tinasegal@tinasegal.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004538

It is important for our nation to have renewable energy. We believe that the Cape Wind Project will provide that., and we hope you can support it.

Sincerely,

Naomi Tina Segal
6051 Kennedy Blvd. E. P/A
West New York, NJ 07093

cc:
Capewind

Adams, Karen K NAE

From: Wil.iam Kriege [info@capewind.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004539

I am totally in favor of the Cape Wind project. Renewable energy will clean our skies and reduce our dependance on foreign energy sources - truly a win-win situation. Please do your part to support this crucial endeavor.

Sincerely,

Wil.iam Kriege
5007 Troostwood Road
Kansas City, MO 64110

cc:
Capewind

Adams, Karen K NAE

From: fannette sawyer [fbhs@earthlink.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004540

Sincerely,

fannette sawyer
27 oakland place
buffalo , NY 14222

cc:
Capewind

Adams, Karen K NAE

From: andrew bent [info@capewind.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004541

Karen Kirk-Adams
696 Virginia Road
Concord, MA 01742-2752

Dear Ms. Kirk-Adams:

Hi my name is anderw and I am a yeir round cape codder I am 16 yeairs and have bin home schooling for the past four yeairs. Starting today I have disided to start coleting informatioin relating to cape wind, wat I plan to do is write a full and detaled report on the topic as well as make a foue posters and if I cain get enouf information for cape wind I plan to make a full vido production that will be aired on Cape Cod coumidy telivishion. So if you could send me any info tords cape wind that would be great. My malling adress is PO box 711 South Yarmouth MA 02664

Sincerely,

Adams, Karen K NAE

From: cynthia c norkin [info@capewind.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004542

There are very few times in one's life when one has an opportunity to make a positive difference in people's health and protects the environment. I believe that the proposed Wind Farm on Nantucket Sound offers just such an opportunity by providing Cape residents with a supply of electricity that causes no air pollution. I believe that present and future Cape residents deserve to have a clean source of energy. The harmful effects of air pollution arising from the emissions of electricity generated from the Mitrant Plant are well known and even if the emissions are "cleaned up" the plant still relies on oil and the possiblity of another oil spill and its destruction of the envirnonment is ever present.

I have read all of the available literature on the Wind Farm including the DEIR/DEIS and the articles in the newspapers. I am also aware tha the UNBited Staes i running out of oil and gas and have learned that MAssachusetts has very few sources of alternative energy. I have also experienced first hand the results of the recent oil spill, the oil covered beaches and have watched the loons and other sea birds struggle in vain to remove oil from their wings. These are sights I do not wish to see again, nor do I want to see the yellow stain of pollution that spreads across the horizon from the oil- burning Sandwich plant. I understand the the the emisssions from this plant contain small articles that lodge deep within the lungs and that the emissions can extend fror twenty miles.

The proposed Wind Farm in Nantucket Farm affords us with a unique opportunity to do something good -to make a positive difference. Massachusetts should be be proud to lead the way and to set an example in providing a clean course of renewable energy. Therefore I strongly urge you to approve the DEIR/DEIS.

Sincerely,

Cynthia C. Norkin, Ed.D., PT

Sincerely,

cynthia c norkin
414 Scraggy Neck Road. P.O. Box 63
Cataumet, MA 02534

cc:

Capewind

Adams, Karen K NAE

From: Eleftherios Pavlides [epavlides@rwu.edu]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004543

Dear Ms. Karen Kirk-Adams:

My testimony in response to the US Army Corps of Engineers report is to strongly urge them to give the permit to Cape Wind to install as quickly as possible, for the following four reasons that are supported by their excellent report –

1. health benefit, 2. economic benefit, 3. benefit to wildlife and to birds in particular, and 4. aesthetic benefit:

1. HEALTH BENEFIT EVEN GREATER THAN REPORTED

It should be noted that the health impact in your report has been understated because you did not include the 800 pounds of mercury that will bio-accumulate in our food supply causing retardation and other such neurological damage.

Was there a reason that they ignore the damage from mercury contamination?

You reported a $53,000,000 a year estimate about the annual medical costs savings from averted pollution.

http://www.nae.usace.army.mil/projects/ma/ccwf/section5tables.pdf

as indicated in section5tables 5.16 - 6

While this is a stunning number is it not true that Cape Wind's 1,489,000 annual MWH are about 1/6th of the electricity produced at Brayton Point? And is not true that Brayton Point pollutes the environment with 240 pounds of mercury annually? Is not fair to say that proportionally Cape Wind will avert 40 pounds of mercury annually? Mercury bio-accumulates in the food chain so it is relevant to calculate the health damage that 800 pounds of mercury bio-accumulating in the food chain over twenty years, for both people and wildlife. Given the fact that mercury is a potent neurotoxin that can cause retardation I believe you should mention this fact even if you cannot quantify exactly the dollar impact on human populations – you might be able to give a range rather than an exact number or just mention the insidious but not easily quantifiable impact of mercury poisoning. A single retardation is an extremely expensive and devastating event.

Recommendation 1.: Please include the reduction of 800 pounds of mercury over the life of the project as an important outcome of the Cape Wind installation.

2. BENEFIT TO WILDLIFE

Averted pollution has an impact on wild life as well – why not be more specific on the impact of the averted pollution on birds, fish, and other species? While you did an admirable job giving a dollar value of $53 million on averted medical costs and averted premature human deaths you should do the same for wild life.

The adverse pollution effects on birds have been seriously understated in your report:

· Acid rain kills snails that are critical part of bird diets to lay hard eggs. Entire bird species experienced regional extinctions from acid rain.

· N0x, Ozone, and S02 not only hurt humans but also cause respiratory damage to bird populations.

· Mercury contamination all but wiped out the loon population in the Great Lakes – reduction of mercury will have an impact on avian populations as well.

· Global warming will cause wildlife habitat loss in general and Cape Wind is a small but important down payment.

This information is critical in light of the extensive studies they did on birds. It would be fair to state that the impact of Cape Wind's installations on bird populations will be positive not just minimal. You state 400 birds a year might run into these modern slow moving turbines (which to me seem slightly exaggerated) but this number should be put into context of birds lives saved from the averted pollution. It is not only premature human deaths that will be prevented by the installation of the wind-turbines but also bird deaths. The net number on the impact on birds' lives is certainly in the positive column by any estimate. Given the ferocious propaganda and widespread misstatements in the press on this issue you have an obligation to be more explicit about this: more birds will live longer lives on the average as a result of Cape Wind's installation.

Recommendation 2.: Please mention that certain number of bird lives will be spared because of the averted pollution and that probably the number of the bird lives saved vastly exceeds the number of birds that will lose their life.

3. ECONOMIC BENEFIT

While they mention the $53 million of averted medical costs they can be more explicit that this is an economic benefit to the people of New England.

They mention that that the economic impact on the rates of electricity will be positive but they should make more clear that while Cape Wind will have an annualized payment of $135 million for the production of electricity at the same time the people of New England will have a direct economic benefit from averted payments to doctors, drug companies, insurance companies, loss of wages, and premature payments to funeral homes.

If we allow Jim Gordon to pay $135 million a year from his own money to make electricity the rest of the people of New England not will save out of pocket the $53 million but also will avoid the human suffering caused by disease.

Recommendation 3.: Please show the economic benefits from averted disease on the economic tables as part of the annual cash-flows.

4. AESTHETIC BENEFIT

Finally while you showed clearly that aesthetic perception as gauged by indirect economic indicators were positive, you failed to discuss the reality that most people see wind turbines as beautiful. Instead you did studies examining whether wind turbines are visible discounting the certainty that based on the indirect economic indicators most people love the sight of elegant, aerodynamic, kinetic forms of slow turning wind turbines.

The report provided studies of where the project will be visible from did not make clear that in fact the view of the turbines will vastly enhance the view for a majority of people and for the overwhelming majority in the future. It is not just people with specialized aesthetic training such as architects (as I am) and artists that who find the view of wind turbines a delight to watch.

The report demonstrates that visual impact is positive with scientific surveys that measure people's perceptions of wind turbines as well as the impact of their view on really estate values. Statistically property values of houses with view sheds of wind turbines rose faster than nearby houses with no view of wind turbines. (section 5 page 275) The report also addresses in great detail the impact that the wind-turbine installation will have on tourism based on scientific surveys of visitors in places with installed wind turbines in tourist areas in Scotland, Australia, California, off the shore of Denmark and off the shore of Sweden. See sections of the US Army Corps of Engineers report 5.16.4.6 Tourism and Recreation (Section 5: pages 276 through pages 278).

With no exception around the worls the installation of wind turbines measurably increased tourism either slightly or dramatically thus providing indirect evidence that visually most people find the turbines as attractive and appropriate addition in nature. In addition to scientific surveys they are innumerable examples of tourists paying money to visit wind turbines. From New Zealand to California and to the Greek Islands and around the globe there are numerous places that people pay money to visit turbines and also photograph themselves in front of them to preserve cherished memories from their vacation. Based on the evidence your report concludes that there will be a POSITIVE impact on tourism resulting from the installation of Cape Wind. (see Section 5.16.5 Summary and Conclusion page 5-283).

As a professor of architecture I can testify that there are two reasons that people experience the visual sense of beauty. One reason that influences the perception of visual beauty is denotation or the formal qualities such as proportion, contrast, rhythm, and movement. People trained in art can evaluate with a greater degree of certainty the visual qualities that we all experience. The other reason that people experience beauty is connotation or the associative or symbolic meaning that is evoked from the visual experience, for example a perfectly manicured lawn can be seen as beautiful because of the associative meaning of care and wealth that it can connote but for others the same identical lawn evoke the associative meaning of the chemicals used that might contaminate water in the nearby well. Identical visual clues can be experienced as both as beautiful and as ugly.
A reason of why many people see the view on the horizon of the Cape Wind Park as “breathgivingly” beautiful is the huge health benefit discussed above. In addition to the formal aesthetic qualities of aerodynamic and gracefully kinetic forms slowly turning in the distance, it is the fact that the visual presence of the wind turbines brings to mind the reduction of invisible toxic gases that despoil the wilderness of Cape Cod the vast majority of people at the Cape will come to see Cape Wind as a magnificent visual presence. Interestingly the opposition to Cape Wind is headed by Mr. Yearly that the New York Times reported as member of the board of Marathon Oil. If I was an executive of a coal or oil company I too would have difficulty seeing modern windmills as beautiful because they have

become an economic threat to fossil fuels ability to hold energy market share. Cape Wind will take a whole percentage point off fossil fuels for the entire New England electricity market.
There is every indication that the Cape Wind Park will be just like the Statue of Liberty, which was resisted as an eyesore over a hundred years ago, its installation was successfully delayed in the nineteenth century for over ten years, but now it is a beloved icon, significantly raising real estate values of houses with views to it. Recently in Manhattan an apartment on the sixth floor sold for $150,000 more than an identical apartment on the fifth floor because it had a distant view of the Statue of Liberty while the one on the fifth floor did not. While the Statue of Liberty is beautiful because of its sculptural qualities the State of Liberty is also visually wonderful because of the meaning of personal freedom and human rights that it connotes.

In the same way Cape Wind will become a magnificent addition to the Cape Cod's visual environment not only because of the inherent beauty of its aerodynamic form, which was designed to move in the wind, but also because of the visual meaning of energy freedom and disease free environment that it will visually communicate to us and to future generations.

Recommendation 4.: Please make sure to include in the final draft that many people (probably a majority) will see Cape Wind as a visual asset in the Cape Cod landscape.

My criticisms should be received as they are intended with a lot of appreciation for this excellent report and with a desire to make it even better. I have recommended this report as required and reliable reading to many people who want to learn about wind energy. If we have success in installing wind energy in Rhode Island it will be to a large extend that your comprehensive report has made all this information available to us.

Sincerely,

Eleftherios Pavlides
352 Lloyd Ave
Providence , RI 02906

cc:
Capewind

Adams, Karen K NAE

From: Irving Taylor [sandow@uri.edu]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004544

Dear Ms. Karen Kirk-Adams:

The construction of a wind turbine complex in Nantucket Sound has my full support. I am very familiar with the Cape Cod south shore, having spent the summers of my childhood, and year round during my teen years, at Bass River. Many of my family have summered there, and more recently lived there year round, starting with my grandfather, Irving K. Taylor, who with his wife built their summer home on Bass River in 1900.

I see little difference in the prospect of seeing the turbines in the distance, as opposed to observing boating activity. Wind turbines are to me an exciting phenomena, and nothing would please me more than to know that we are pioneering their use here in our area.

Wind turbines present no hazard to the environment that I know of, and instead, offer a resounding PLUS.

Sincerely,

Irving Taylor
105 Scrabbletown Road
North Kingstown, RI 02852

cc:
Capewind

Adams, Karen K NAE

From: Marilyn Sullivan Strachan [marilynstrachan@Verizon.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Karen Kirk-Adams
696 Virginia Road
Concord, MA 01742-2752

Dear Ms. Kirk-Adams:

004545

The major problem confronting the citizens of Massachusettes today are upper respiratory ailments that are the highest in the country. If we continue to ignor the sources impacting this phonomonon we are contributing to the diagnosis of ASTHMA, EMPHESEMA, BRONCHITIS, PNEUMONIA along with heart conditions Coronary Artery Disease, Congestive Heart Failure. Myocardio Infarctions which put the youngest and eldest in our society at the highest risk.

One must ask themselves why than are politicians in Massachusettes so opposed to a form of clean alternative energy which offers the beginning to solving our clean air problems. Are they supporting the wealthiest amongst us who think their panoramic views might be compromised by a few dots on the horizon. We should be applauding the developers of this project for their contribution to healthy air for all of us to breath.

Sincerely,

Adams, Karen K NAE

From: TRISTRAM W METCALFE III [twm3@rcn.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004546

Dear Ms. Karen Kirk-Adams:

I am a registered architect with 35 years of professional practice with a major focus on historic preservation of the built environment. I have been on historical commissions and boards of historical societies. I personally and professionally very strongly believe that our built environment is devolving aesthetically due to lack of vision in quality design issues, while in our past these values were held much stronger.

There come times in human history when those who actually can see the more important issues, must take action. We should not follow those who think they see, or see only what they do or don't want to see, if we are to truly have the healthy future we all need.

Limited vision of the big picture of what the built environment will be like for those who follow us is not serving the next generations well. They will be forced to experience what we leave for them. The built environment has been said to be the largest voice of what a civilization says to future civilizations.

We have a very simple Up or Down choice; Do we hold Up and preserve the environment or do we let it Down to devolve and become worse for those who must follow us?

We must not let short sightedness, lacking vision of the bigger issues control. We MUST protect the larger macro issues by preventing the very worst thing we could ever possibly do. This grave error would be to adversely affect our planet's climate. It would destroy all that we know and love in unstoppable causes and effects of climate change. It's laughably absurd how that climate destruction would be so much worse than merely looking at the wind technology which will help to save our environment and our civilizations.

Tristram Walker Metcalfe III, AIA

NCARB NY MA CT
142 Main Street
Northampton, MA
ZIP CODE 01060
Ph 413 586 5775
Fx 413 586 2577

Sincerely,

TRISTRAM W METCALFE III
142 MAIN ST
NORTHAMPTON, MA 01060

From: Dennis Sentenac [info@capewind.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004547

Karen Kirk-Adams
696 Virginia Road
Concord, MA 01742-2752

Dear Ms. Kirk-Adams:

For lifetimes New England has been subject to the vagaries of the oil and natural gas market to produce electricity.
Now a good start in reducing that dependence is at hand: the Cape Wind project.
We can support this state-of-the-art wonder, or we can continue to mire ourselves in the same old mentality and dependence on fossil fuels.
The just-issued Draft EIS supports the only sensible alternative: go forward with Cape Wind!
My vote is joined with that conclusion!

Sincerely,

Adams, Karen K NAE

From: Lauryn Slotnick [lhs9@cornell.edu]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004548

The U.S. Army Corps of Engineers has released the Cape Wind Draft Environmental Impact Statement and they have been very detailed and thorough. Please support clean, renewable energy and grant Cape Wind its needed permits. We need to do everything we can to ensure that clean wind energy is powering Cape Cod and Massachusetts as soon as possible, and hopefully many other places soon to follow.
Thank you for your time.

Sincerely,

Lauryn Slotnick
239-44 66th Ave
Douglaston, NY 11362

cc:
Capewind

From: Theodore Rice [CHK1214@aol.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004549

Karen Kirk-Adams
696 Virginia Road
Concord, MA 01742-2752

Dear Ms. Kirk-Adams:

I have been listening to the continuing debate on this subjectfor the last two years, all the whilr the price of imported oil continues to rise affecting every facet of our lives.
The " Save the Sound " contingent, including the politicians who are drawn to their money, continues to come up with one specious reason after another to stir up the public.

This is a no brainer.
We are offered a source of reusable energy And an endless supply of it.
The only environmental damage is to a privileged group who want us to believe the nonesense that they keep spouting.
These are the wallets that are fueling the opposition.

Please make a decision based on intelligence and logic rather then on emotion and mass hysteria.

Sincerely,

Adams, Karen K NAE

From: IrishHomestead1@aol.com

Sent: Wednesday, February 23, 2005 7:01 PM

To: Energy, Wind NAE

Subject: preserving a quality of life

004550

It is ironic that we should give away that which was given to us free for profit to one company with little benefit for the populace of the Cape, the Islands, and throughout Massachusetts. Since when has the voice of the general public been heard and acted upon fairly. This is a travesty of true integrity and justice. We are destroying everything in our path for the so-called word which has been bandied about for year which is progress. Not true. we are killing everything is sight. Is this what we, the people ask for? No., emphatically no.

I do hope you will see the folly of the decision you are about to make without the true input of those who will be hurt monetarily, and ethically.

Eileen M. Hughes
6 Niagara Lane
West Yarmouth, MA 02783
e-mail Irishhomestead1@aol.com

From: Edward Gilman [shed@shedward.com]
Sent: Wednesday, February 23, 2005 6:58 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004551

Sincerely,

Edward Gilman
514 Gleasondale Road
Stow, MA 01775

cc:
Capewind

Adams, Karen K NAE

From: richard milardo [milardor3@yahoo.com]
Sent: Wednesday, February 23, 2005 7:00 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004552

Working in the electric utility field for the past 29 years,I feel this is the next step in providing clean and inexpensive electricity to the state when prices are just starting to rise because of deregulation and high natural gas prices.

Sincerely,

richard milardo
1 lady slipper ln.
hadley, MA 01035

cc:
Capewind

Adams, Karen K NAE

From: Gary Flomenhoft [gary.flo@uvm.edu]
Sent: Wednesday, February 23, 2005 7:02 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004553

Dear Ms. Karen Kirk-Adams:

I own a sailing business on Cape Cod (http://www.outercapesailing.com), and have been a part-time resident for almost 30 years. I enthusiastically support the Cape Wind project and my customers support it also. Wind is the way to go!

My one suggestion in the licensing of OUR federal land offshore for commercial projects is that we the owners receive some rental or royalty payments for use of OUR land, as they do in Alaska for oil.

Please support Cape Wind!

Gary Flomenhoft, owner
Outer Cape Sailing
Wellfleet, MA

Sincerely,

Gary Flomenhoft
PO Box 1936
Wellfleet, MA 02667

cc:
Capewind

Adams, Karen K NAE

From: Bill Wright [william.wright7@comcast.net]
Sent: Wednesday, February 23, 2005 7:26 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004554

Dear Ms. Karen Kirk-Adams:

I simply wish to let you know that I support the Cape Wind project. It is my opinion that we are well past the time to put clean energy in an extremely visible place, one frequented by Americans from all over the country. By doing so I believe more and more people will realize that the wind turbines don't look as bad as they thought. Perhaps this will result in more areas of our country considering similar installations, improving air quality and reducing dependence on foreign oil.

Sincerely,

Bill Wright
176 Main Street
Yarmouth Port, MA 02675

cc:
Capewind

Adams, Karen K NAE

From: LIBSTEVE@aol.com
Sent: Wednesday, February 23, 2005 7:32 PM
To: Energy, Wind NAE
Subject: Cape Wind Project

004555

We are firmly opposed to the industrial wind farm scheme being proposed for Nantucket Sound. These are the reasons:
1.) It represents a free land give-away to a private, for-profit developer. Regulations are unformed on this issue, and no company should be given free land.
2.) It is environomnetally suspect to birds, sea wildlife and water quality.
3.) It is harmful to the struggling commercial fishing industry, an important part of our economy.
4.) It is an esthetic disaster, with our main industry, tourism, being confronted with our beautiful seacoast turned into a version of Galveston Harbor.

Steve and Libbi Campbell/Tisbury, MA

Adams, Karen K NAE

From: Harriet Goldin [info@capewind.org]
Sent: Wednesday, February 23, 2005 7:33 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004556

Dear Ms. Karen Kirk-Adams:

I support the Cape Wind project and hope that all legislative officials will also support this important renewable energy project.

The support of wind power as a solution to our nation's energy crisis will help us preserve both our way of life and our planet's delicate ecosystem and is vital to our nation's future.

Sincerely,

Harriet Goldin
27 Petrini Circle
Needham, MA 02492

cc:
Capewind

From: Nancy S. Lovejoy [lovejoy@crocker.com]
Sent: Wednesday, February 23, 2005 7:35 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004557

Dear Ms. Karen Kirk-Adams:

The Cape Wind project is a vital first step toward renewable energy. As a nation we must take all necessary steps to go forward with such energy sources for the sake of our planet and all living beings on it. I hope you will do everything possible to insure that this project will go forward.

Sincerely,

Nancy S. Lovejoy
425 Mountain Road
P.O. Box 158
Wilbraham, MA 01095-0158

cc:
Capewind

Adams, Karen K NAE

From: jean fisher [rascal@gis.net]
Sent: Wednesday, February 23, 2005 7:42 PM
To: Energy, Wind NAE
Cc: rascal@gis.net
Subject: Nantucket Sound Wind Farm

February 23,2005

004553

U.S.Army Corps of Engineers
N.E. District
Cape Wind Energy EIS Project
696 Virginia Rd.
Concord, MA 01742

Attn: Karen Kirk Adams

Re: Nantucket Sound Wind Farm

This letter is sent to show our support of the Wind Farm.

Fossil fuel emissions are effecting our environment and the wind farm would displace this. It would also help to reduce electricity charges and help create less dependency on imported fossil fuels. We feel there are more benefits than losses and look forward to seeing the wind farm in our life time.

Sincerely,

Jean & John Fisher
W.Yarmouth, MA

Adams, Karen K NAE

From: donald [saltboxmacs@comcast.net]

Sent: Wednesday, February 23, 2005 8:02 PM

To: Energy, Wind NAE

Subject: Save Our Sound

004559

We're are not against the wind farm concept to help with energy usage, however, we feel the Nantucket Sound location is not an ideal spot for these wind farms. It will take away from the beauty of our natural resource, Nantucket Sound. This will also avoid any chance of a navigational or environmenal hazard.

We suggest the wind farms be located in the same area as the high tension wires, an out of the way location away from the public's view. The land would be used for the similar purpose - energy ... as they do in California.

Don & Phyliss MacIntyre

Adams, Karen K NAE

From: David Jacobson [info@capewind.org]
Sent: Wednesday, February 23, 2005 7:48 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

4560

Dear Ms. Karen Kirk-Adams:

I writing to let your know that I fully support the Cape Wind Project. Though the project will have some drawbacks, most notably the visual impact for the residents of portions of Cape Cod and the Islands, the overall benefits outweight the costs. We must begin a path of developing sustainable non-polluting energy sources and this is the one of the best opportunities to come along. Without such projects, the impacts of fossil fuel burning related pollution, sea level rising due to global warming and the military cost of securing our ever increasing demand for fossil fuels will hurt the Cape more in the long run then the siting of these 130 turbines.

I look forward to the approval of this project so I can have one in my own backyard.

Thank you for your consideration

Sincerely

David Jacobson
166 Arlington Avenue
Providence, RI 02906

Sincerely,

David Jacobson
166 Arlington Avenue
Providence, RI 02906

cc:
Capewind

Adams, Karen K NAE

From: Bruce Hambro [bruce2dh@yahoo.com]
Sent: Wednesday, February 23, 2005 8:04 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004561

Dear Official,
I support the development of the CapeWind project. It's time has come. And everybody knows it. I don't have to reiterate the reasons. They were all brought out at the Army Corps hearings this winter. It's a no-brainer. If you don't agree--then you have no brains!!

Kind regards,

Bruce Hambro

Sincerely,

Bruce Hambro
19 A Sagamore Way
Waltham, MA 02453

cc:
Capewind

Adams, Karen K NAE

From: Andrew Wallace [andycapp@mac.com]
Sent: Wednesday, February 23, 2005 8:17 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

I am writing to express my support for aggressive investments in alternative, renewable energy sources. As an educator, I feel it would be criminal to turn our backs on the viable Cape Wind project. I ask my students to consider how best to solve problems, and in today's world, that must mean a restructuring of values and new ideas about consumption and sustainability. I urge you to send the right message to our children and support the creation of this important project. Thank you.

Sincerely,
Andy Wallace

004562

Sincerely,

Andrew Wallace
17 Anoka Ave. #2
Barrington, RI 02806

cc:
Capewind

Adams, Karen K NAE

From: Don Schwinn [donschwinn@alltel.net]
Sent: Wednesday, February 23, 2005 8:20 PM
To: Energy, Wind NAE
Cc: anne.canaday@state.ma.us
Subject: Cape Wind Energy Project Comments

Importance: High

Thomas L. Koning, Colonel
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751
February 15, 2005
Re: Cape Wind Energy Project DEIS
USACE #NAE-2004-338-1

004563

February 23, 2005

Dear Colonel Koning:

This letter contains our comments on the Draft Environmental Impact Statement (DEIS) on the proposed project in Nantucket Sound.

After 50 years of summering in Wellfleet and Orleans we purchased our house in Cotuit because of the wonderful fishing and boating that exists in Nantucket Sound, as well as the beautiful and peaceful views over the water. Now that is all threatened by the conversion of the center of Nantucket Sound to a power plant.

In general, we believe the DEIS is contains a great deal of inadequate science and data for such a mammoth project in such a delicate and cherished location. Among the issues of greatest concern to us are:

Oil Spills

The EIS fails to thoroughly address the impacts of an oil spill. Rather it says only that an oil spill and containment contingency plan will be drawn up. It fails to mention that should a spill occur, there is virtually no way to stop it from reaching our beaches because of:

1. The short travel distance from the windfarm to the shore.
2. The time it would take to deploy oil booms
3. The ineffectiveness of oil booms in the currents and waves that prevail in Nantucket sound.

And should an oil spill occur, such as in the case of the tanker Bouchard in Buzzards Bay, the public is left with the lion's share of the cleanup cost.

The DEIS should contain the entire oil spill prevention and cleanup plan. It should also contain projections of what would occur if an oil spill happened.

Bird Kills

We often visit Dead Neck and Sampson's Islands to view the many shorebirds there. These islands are the nesting habitat of one of the largest piping plover populations in the northeastern U.S. In addition, hundreds of terns and other shorebirds use these islands as nesting and feeding habitats. The DEIS makes no mention of these or any other specific bird habitats that could be affected by the proposed project.

The DEIS should address the impacts of the project on each specific major nesting area from which birds could fly into the project area in the normal course of foraging or migration.

Recreational Fishing

I and many of my fellow fishermen use Horseshoe Shoal for fishing. Targeted species include striped bass, bluefish, fluke, and scup. Several tournaments held annually by local fishing clubs use the shoal as an important catch area, including those held by my fishing club, the Osterville Anglers Club. The DEIS fails to examine what the impacts of the project might be on the aesthetics of fishing among over one hundred huge rotating turbines. It is my belief that the project would greatly hamper and discourage recreational and charter fishing among these mechanical behemoths.

There seems to be no precedent or discussion as to how the vibrations and shadows might affect the presence of these particular species. However, we can easily speculate that there will have to be some significant negative impacts. With no localized well-found science to back it up, the DEIS can only make assumptions on marine animal impacts in the proposed site.

Boating and Navigation Safety

In addition to fishing, we and many of our local residents cruise through the proposed site on their way to the Striped Bass, Bluefish, and Atlantic Bluefin Tuna grounds east of Chatham and Nantucket. Passages to Nantucket and Muskegat Channel may also pass through the site. A significant percentage of these boats have no radar, and even if radar equipped, would have to reduce speed significantly in restricted visibility through the field of turbines. Even with radar, the multitude of blips on a radar screen coupled with the numerous foghorns proposed would be confusing to a boater. Therefore the risk of boats colliding with each other, or with a turbine tower, is high in the reduced visibility so common to Nantucket Sound.

The DEIS glosses over these impacts on recreational and charter fishing boat movements. In addition, the DEIS itself contains no evaluation of the impacts of the turbines on search and rescue operations in the turbine field.

Visual Impacts

In addition to those residents who will be able to see the turbines directly from their homes, there is a much larger component of our community who cherish the unobstructed view from our hills, beaches and from their boats. Indeed, it is this uncluttered view of the sea that draws people to visit and live on Cape Cod. Construction of the proposed project represents a global change in the character of Nantucket Sound. At night, hundreds of warning lights will mar the views of the moon and stars.

We believe that the DEIS is totally inadequate in addressing this change in character on the overall aesthetic value and nature of Cape Cod.

Alternative Site Evaluations

The land-based sites chosen for alternative evaluation are in New England areas where public approval or grid connections are difficult. As there seems to be no power shortage in Eastern Massachusetts, or New England for that matter, we do not understand why sites outside of New England were not studied. The federal renewable power subsidy would be available anywhere. There are successful and welcome wind farms in Central New York on unused farmland and the State is interested in more.

Our winter home in Madison County New York is the site of 2 successful wind generating facilities. They are successful because they are on unused farmland on high ridges with ample wind, and their taxes and lease payments add to the local rural economy. (However, they are unpopular with many of those who have to look at the warning lights at night).

The alternative site analysis should be expanded to cover potential sites in the Northeast, not just New England.

Cumulative Impacts

The EIS looks primarily at the individual impacts of the project but fails to address the cumulative negative impacts in a holistic manner. Although the individual probability of an adverse effect may be small, the possibility of any one of dozens of negative impacts occurring in a specific time frame is much higher. In addition, the DEIS does not address the cumulative negative impacts over a long period of time.

In closing, it is our belief, and that of our family of Cape Cod visitors, that a body of water that is so valuable to the nature of its surroundings should not be sacrificed to a developer seeking cheap land and federal subsidies for his pure profit motive. The cumulative potential negative impacts of the project far outweigh any public benefit.

Very truly yours,

Donald E. Schwinn
24 Point Isabella Road, Cotuit, Mass. 02635
1849 Burlingame Road, Cazenovia, NY. 13035

Adams, Karen K NAE

From: MSPRING582@aol.com

Sent: Wednesday, February 23, 2005 8:56 PM

To: Energy, Wind NAE

Subject: (no subject)

004569

Ms. Karen Adams, Project Mgr, Reg. Division
Cape Wind Energy Project
US Army Corps of Engineers
Concord, Ma.

Dear Ms. Adams:

Even at this last minute of the February 24th cut-off date, I want to offer my thoughts and comments on the Cape Wind Project as a 50 year resident of Cape Cod, and list about a dozen reasons why this project should NOT be offered at this time.

I. There is no question that wind energy is an excellent source of power and is here to stay, but the proposal of the locations and number of these huge and unsightly turbines is a very controversial and sensitive one.

2. It is just because this is such a far-reaching and difficult subject to resolve that each one of us "voting" residents of Cape Cod should be afforded every right to express his views by individual voting.

3. My main objection to the project is that these turbines will ruin one of the finest shallow shoals (1-2ft. depth at low tide) fishing areas that so many recreational fishermen have enjoyed since fishing began. No matter what the developer says, the fishing there will be ruined for all those who come after us.

4. Even if this new source of energy is produced on Cape Cod, there is no guarantee that the residents here will gain the benefit of it. According to reports the supply here is less than 1% of New England's total supply.

5. The towers will create visual blight, noise and light pollution as well as kill off many different species of wildlife and birds.

6. The proximity of the turbines to shipping routes could pose a hazard to safe shipping and air navigation.

7. Our governor as well as New Jersey's and South Carolina's have written to the US Commission on ocean policy that any development on "off-shores" of coastal states has to be guided by a national plan.

8. Our Mass. Attorney has challenged the Army Corp's legal authority to allow private use of Nantucket Sound.

9. The Steamship Authority and Hy-line Cruises have opposed the wind plant due to concerns about public safety.

10. The US Commission on Ocean Policy critized the review process for off-shore wind and called on Congress to pass needed federal legislation.

11. Several environmental groups such as the Mass Audubon, the Humane and wildlife groups have expressed concerns over the Draft environmental Impact Statement as a document which does not capture the true essence of Nan-tucket Sound.

12. Once, IF, in fact, the many claims that the developer has made, are not substantiated-------------there will never be any turning back to the natural beauty of offshore Cape Cod.

Sincerely,

Wolfe Springer
249 Shorewood Dr.
E. Falmouth, MA

Adams, Karen K NAE

From: Kelleypd@aol.com
Sent: Wednesday, February 23, 2005 8:25 PM
To: Energy, Wind NAE; mepa@state.ma.us
Subject: Cape Cod Wind Turbine Proposal

February 23, 2005

From:

Peter D. Kelley
1106 Chestnut Street
Manchester, NH 03104-2001
(603) 647-9471
kelleypd@aol.com

004565

Karen Kirk-Adams
Army Corps of Engineers
wind.energy@usace.army.mil

Secretary Ellen Roy Herzfelder
Executive Office of Environmental Affairs
mepa@state.ma.us

Dear Ms. Karen Kirk-Adams, Army Corp of Engineers and Secretary Ellen Roy Herzfelder, Exec Office of Environmental Affairs, State of Massachusetts:

I would like to voice my strong support for the Cape Wind proposal for Nantucket Sound, off Hyannis, MA. I have lived summers and some portions of winters in Cotuit, Cape Cod, which is near Osterville and Hyannis and is a village of Barnstable. I regard Cotuit as being my favorite spot on the earth; it is my spiritual home. When I was born in Wareham, MA in 1951, my parents lived in a house on Main Street in Cotuit not far from the Loop Beach. The proposed wind turbines would be visible from Cotuit. I have family in the Boston area in Cohasset, Milton, Hingham and Medford who visit Cotuit. We all visit Cotuit, have previously owned property there, I rent in Cotuit each year, and we strongly support the project.

I think the wind turbines would themselves be an extremely positive and encouraging sight on Nantucket Sound, and virtually anywhere. The turbines represent some relief from oil dependence and air pollution. I know the turbines present potential problems for migrating birds. This is something that can be addressed. In terms of naviagation and commercial and pleasure boat traffic, including ferry traffic to and from the Islands, the problems seem readily managable and, most importantly, WORTH THE INCONVENIENCE and RISK. The blades of the towers are high enough that most boats would not be at risk from the towers even it they lost their way.

Another issue is compensation to the state and federal government. I would like to make a comparison to sale and leasing of grazing and mining rights in the U.S. heartland and western states. Historically these grazing and mining rights have been sold or leased at far below any reasonable market rate, the classic sweetheart deal, and the American public has borne the cost of overgrazing and strip mining. The Cape Wind project stands to protect our coastline from development of coal and nuclear power plants. I have worked for a period for the NH Pubic Utilities Commission and became acutely aware of the reasonable difficulty of siting any power generation plant.

I was not able to testify in person at the opportunity given for public comment at M.I.T. late last year.

We need this Cape Wind project and we need it now. As a resident of Cotuit and a person acutely concerned with the enviornment on Cape Cod, I strongly encourage you to expedite approval of this proposal.

Thank you for the opportunity to make these comments.

Sincerely,

Peter D. Kelley
Manchester, NH

Adams, Karen K NAE

From: Wirtanen, Mark [mwirtan@entergy.com]
Sent: Wednesday, February 23, 2005 8:31 PM
To: Energy, Wind NAE
Subject: Cape Wind Project

004566

To Whom It May Concern, Feb. 23, 2005

I am a life long resident of Barnstable. I've been sailing on and across Nantucket Sound for over 35 years on boats the size of Beetlecats to 40' sloops. I'm a 1977 Mass. Maritime Academy grad and am in favor of the Cape Wind Project. We need to reduce our dependence on foreign oil and improve our air quality at the same time. That will also reduce the chance of more oil spills like the one in Buzzards Bay last year and reduce our trade deficit. I want my utility bill to pay someone local to provide me with electricity not a foreigner who may be funding terrorism! The half truths and Lies spewed by the "alliance" make me sick. Please support this great project.

Thank You, Mark Wirtanen
1894 Main Street
West Barnstable, Ma. 02668

Adams, Karen K NAE

From: al.geo@rcn.com
Sent: Wednesday, February 23, 2005 8:38 PM
To: Energy, Wind NAE
Subject: Oppose to Wind Farms

004567

I Just came back from Colombia South America. My husband and I volunteer to help educate them of Plumbing Code for healthier lives. If anyone needs help with air pollution it is them.

I can't believe how bad the air is from public buses, trucks, cars. There is no emmission control in these many countries. I am convinced by what I experience that putting 130 wind mills in a beautiful natural resource is just big business for a few people. With so many not conserving their resources and U.S.A. is one nation that doesn't conserve or educate people to be thoughtful of the energies and resources we have.

We do need renewable energy but not with the expense of another natural resource.

I am in the hospitality business and have asked my guest about seeing 130 wind mills of our shores and beaches.They can see the data tower from the shore. Once explaining the size of that compared to the size of the wind mills it is obvious that it will look like an Industrial Park. I received many comments against allowing the mills go up. Even people from Denmark. I have many names from my guest that I turned in to Save Our Sound to show that the Tourist that spend many years here on Nantucket Sound feel it will be such a great lost to the area. They also have told me that they would go to other areas that aren't marred by industry. My heart became very heavy with saddness because I know how people feel.

It's not equal to compare our Sound to Denmark. First they do not have 130 wind mills and not 400 + feet in the air. It is not fair to compare apples with oranges. They are on equal. All they have in common is that they are in the water.

This is such a large project with no guarantee that it will save electricity for Cape Cod.

We do have an example of the Electric Power Plant in Sandwich. I remember they sold the idea about renewable energy with that plant too. They promised that the Town of Sandwich would not have to worry about Tax increase, or schools because of the taxes the power plant will pay the Town. Well you don't have to be a rocket scientist to see how that worked out 30 years later. Town of Sandwich is one of the highest tax increase on property. And the Power Plant went bankrup with over 2 Million Dollars that they never paid the Town. Now they want to turn it into a liquid Amnonia plant. How renewable is that?

The pollution that it has caused. Never been forced to put on the filters that they needed to keep pollution down. The Government was giving them even more time to apply the filters. Look where that went....NO WHERE.

Cape Winds is just a different name but big business who wants to ruin Cape Cod for their own benefit. We will never see electric prices go down. And who is to say that most of the pollution isn't coming from other countries that don't have codes for health.

The mills could work just a well on land which I believe will happen after Cape Winds gets their land on Nantucket Sound and ruin another natural resource.

Please there is no proof that we will not receive damage from these mills. Force them to look for other alternatives like they were suppose to 2 years ago. Please help preserve a natural resource where people can go with their families to just get away from the Industrialized areas that they have to work in all year. We need this for humanity....Thanks for listening...Alice Fardy

Adams, Karen K NAE

From: Donald Harrison [donharrison@verizon.net]
Sent: Wednesday, February 23, 2005 8:46 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004568

Dear Ms. Karen Kirk-Adams:

Having just returned from 2 weeks in Palm Springs, Ca and seeing first hand the tremendous impact of wind generation, I am in full support of this project. It not only is clean generation but helps to supply needed electricity with very little cost to the consumer. Thanks for moving this project to successful conclusion. Donald J. Harrison

Sincerely,

Donald Harrison
118 Remick Rd
Effingham, NH 03882

cc:
Capewind

Adams, Karen K NAE

From: Carol and David Knapton [CDKnapton@Hotmail.com]
Sent: Wednesday, February 23, 2005 8:59 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004569

Dear Ms. Karen Kirk-Adams:

Cape Wind Project

We are totally in favor of this wonderful clean energy technolgy, and are very hopeful that Cape Wind we will be a reality. Carol is asthmatic and allergic to hydrocarbons and diesel fumes. We both worry about LNG tankers near Boston, about the cost of our electricity and our oil, and the possibility of offshore rigs. In 2000, we were entranced by the many miles of graceful wind turbines on Rte. 84 near Livermore, Cailfornia. These turbines are not ugly; they look like modern art! What is ugly are oil rigs and tankers and oil spills and noxious power plants spouting fumes!

Sincerely,

Carol and David Knapton
100 Lawton Road
Needham, MA 02492

cc:
Capewind

Adams, Karen K NAE

From: Sally Harvey [sally@londoneyegraphics.com]
Sent: Wednesday, February 23, 2005 8:59 PM
To: Energy, Wind NAE
Subject: Nantucket Wind Farm

Army Corps of Engineers
Please note my opinion for the proposed Nantucket Wind Farm is that of hopeful expectation. I am totally for the Wind Farm after reading factual documentation from both sides of this development.

004570

I think it's about time we started acting environmentally responsible for the very short time we are here on the earth, instead of depleting it's resources - for our grandchildren and the world to see.

I approve the Nantucket Sound Wind Farm and I think it will be a wonderful tourist attraction.
Kind Regards
Sally Harvey
(a concerned Dennisport resident)

Adams, Karen K NAE

From: Mark Osborne [m_osborne2@excite.com]
Sent: Wednesday, February 23, 2005 9:03 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004571

Dear Ms. Karen Kirk-Adams:

As I commute into Cambridge daily I am often struck by the smog that envelopes some of the beautifyl architecture of the Boston skyline. I am reminded that our way of life has had a significant impact on our planet and our health. The proposed project in Nantucket Sound is a way to generate much-needed energy while having a vastly reduced environmental and economic "footprint" than typical fossil-fuel power plants. Imagine how residents of the areas affected by the Cape Wind project would feel instead if a new fossil fuel-burning power plant was being constructed in their neighborhood? They would likely be much more upset. Yet, they do not propose an alternative.

I urge you to continue the support of this important project in the hope that our society can begin to deliver more reasonable alternative energy sources to us.

Thank you for your kind attention.

Mark Osborne
32 Bennington St.
Needham

Sincerely,

Mark Osborne
32 Bennington St
Needham, MA 02494

cc:
Capewind

Adams, Karen K NAE

From: Pat Vince [italianglass@comcast.net]

Sent: Wednesday, February 23, 2005 10:15 PM

To: Energy, Wind NAE

Subject: Nantucket Wind Farm

004572

They say every little helps, hence my letter to you.

Listening to the for & against. I am 100% in favor of the wind farm.

The latest news on the radio today,Wed.23rd Feb was that the noise from the wind farm could harm fish & bird life, which is complete rubbish, also, the state has extended its borders, conveniently so.

I truly believe that the opposition is concerned with money & power & not the welfare of the environment . & sadly, not in the too distance future, it will be too late .

Pat Vince
Dennisport Resident

Adams, Karen K NAE

From: anju rajani [anjurajani@hotmail.com]
Sent: Wednesday, February 23, 2005 9:41 PM
To: Energy, Wind NAE; mepa@state.ma.us
Subject: Comments on the Draft EIS- Cape Wind Project

004573

Comments on the ACOE DEIS for the proposed Cape Wind project

To Whom It May Concern:

I am writing to thank the ACOE for conducting a comprehensive investigation into the environmental impacts of the proposed wind farm. I am a proponent of renewable energy advancement, globally and locally. I have followed the project closely and have always thought that the project would be a great benefit for this region. Now, with the results of the DEIS, it is conclusive. As a year round resident of Cape Cod, I am proud of the unique qualities of this area. I am also proud of our wind resource and am excited that we will be able to harness this resource and make it an opportunity for the people of this area. It represents economic and environmental benefit; it also represents a step in the right direction. It is a step away from fossil fuels and a step towards smart energy options. From my many conversations with fellow residents, I believe the majority of the residents of Cape Cod support this project. Cape Wind has weathered the scrutiny, and this topic has been debated for too long. We have the results, the results indicate that this project will pose minimal environmental and safety impact. Let us move forward with this, let us learn from this process and let this country look to this technology as a viable source of power and let us take this technology forward and create a smart, healthy, sustainable and local industry.

Thank you,

Anju Rajani
9 Barbara Lane
No. Falmouth, MA 02556
508-564-7689

Adams, Karen K NAE

From: Eric Emmons [eemmonshbs2002@yahoo.com]
Sent: Wednesday, February 23, 2005 9:20 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

Sincerely,

004574

Eric Emmons
43 Grove Street
Boston, MA 02114

cc:
Capewind

Adams, Karen K NAE

From: Nathaniel Dummer [nnd524@yahoo.com]
Sent: Wednesday, February 23, 2005 9:53 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

I support the Cape Wind project because it makes electricity without using fosil fuels. It will help to add additional power so that more conventional power plants will not be needed in the future.

004575

It is clean power.

It is especially needed as soon as possible to conteract the increased cost of power now that Massachusetts is entering "deregulation".

Sincerely,

Nathaniel Dummer
34 Wethersfield St.
Rowley, MA 01969

cc:
Capewind

Adams, Karen K NAE

From: Eileen Foster [emfoster@backyardfilms.com]
Sent: Wednesday, February 23, 2005 10:06 PM
To: Energy, Wind NAE
Subject: Thumbs UP on the Nantucket Wind Farm

004576

Karen Kirk Adams
Cape Wind Energy Project
EIS Project Manager
Army Corps of Engineers
New England District
696 Virginia Rd.
Concord, MA 01742-2751

Dear Ms. Kirk Adams:

As a resident of Cape Cod, I support the development of an off-shore Wind Farm on Nantucket Sound.

American wind-power generated on Nantucket Sound will be beautiful thing to behold and will be less harmful to the environment than a nuclear power plant installed in a populated location.

People in the five towns near the Pilgrim nuclear power plant in Plymouth, Massachusetts have an increase in leukemias; Wind Power will have no adverse effects on human health. (Dec. 1987, THE LANCET)

With the "end of cheap oil" looming in the next 25 years, America will need to make a choice between alternative energy sources. It would be tragic to the peoples of Cape Cod for that choice to be nuclear by default.

For the future health of Cape Cod, please permit the development of the Wind Farm.

Regards,

Eileen Foster
161 Depot Street
Dennisport, MA 02639

Adams, Karen K NAE

From: John Lennox [jackandbea@comcast.net]
Sent: Wednesday, February 23, 2005 10:16 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004577

Dear Ms. Karen Kirk-Adams:

I strongly support construction of the Cape Wind Project on Horseshoe Shoal and request that the Draft Environmental Impact Statement be approved as soon as possible.

I am a 61 year old man presently living on Cape Cod. I served in the U. S. Military for 24 years and have been involved in the preparation and review of Draft EIS's for several large ground based radars. My overall assessment is that the Cape Wind Draft EIS is a well done document and addresses major issues in a thorough manner.

I do, however, have one comment that I feel would improve one aspect of the document. Some opponents to the Cape Wind Project feel that the visual impact of the wind farm on Horseshoe Shoal is cause enough to stop the project. I do not agree with that statement and feel that the opposite is true. People will find them to be beautiful. The EIS could do a better job scoping the visual "impact" by the addition of text and Tables/Figures. Based on comments that I read in the Cape Cod Times, I feel that opponents believe the wind farm will cover the horizon from the east to the west as far as they can see. That is not true. If one looks at the wind farm from Point Gammon, 4.7 miles from the wind farm, the wind farm will only occupy a limited section of the horizon, an angle subtended by the eastern most WTG and the western most WTG from Point Gammon. That angle may be just 30 degrees. I have not done the calculations, but a Table could be constructed listing various observation points (beaches, historical sites, etc.), their distance to the wind farm, and the visual angle on the horizon that the wind farm would cover. That data with a Figure illustrating one case and a narrative description of the Table and Figure would help people understand the limited visual impact that the wind farm would have. The EIS must also emphasize that the wind farm will only occupy 24 square miles of the 550 square miles in Nantucket Sound. I believe that the wind farm will not have a detrimental impact on tourism. Tourism on the Cape has fallen during the last two years, and the wind farm may even help bring new people from around the world to the Cape.

The EIS adequately addresses my concern for recreational and commercial fishing and is consistent with information that was provided by a commercial fisherman at one of the information sessions held at Cape Cod Community College. My other concern for Federally-listed protected species has been addressed by the EIS determination that there "does not appear to be an important area (i.e. Horseshoe Shoal) for these species of whales" and that turtles, especially Kemps' ridley turtles, are not observed in the shallow Horseshoe Shoals area.

I fully support the Cape Wind Project for three reasons. Number one: it is the right thing to do! We need to protect the environment. This wind farm alone will not solve the world's problems but it will improve air quality here on Cape Cod in the long term, without significamnt impact to the marine environment. We need to start one step at a time. Number two: It will help our college graduates here on Cape Cod get jobs. Cape Cod Community College (CCCC) has initiated an educational program centered on wind technology because they believe that it is an important technology for our future. CCCC believes that by offering this study to college students on the Cape, they will prepare students for jobs around the world. I applaud their foresight. Cape Cod could become the center for this technology in the United States. Cape Wind can help CCCC achieve that goal. Number three: the wind farm will benefit retired people on Cape Cod living on fixed incomes by stabilizing the cost of electricity. The biggest shock I had when moving to Cape Cod was the high cost of default electricity. Others share that pain.

Once again, I strongly support approval of the Draft EIS.

Sincerely,

John E. Lennox

Sincerely,

John Lennox
680 Samoset Road
Eastham, MA 02642

cc:
Capewind

Adams, Karen K NAE

From: Bryan Sheehan [bryansheehan@charter.net]

Sent: Wednesday, February 23, 2005 10:49 PM

To: Energy, Wind NAE

Subject: Cape Wind public comment

004578

Respectfully submitted to the Army Corps of Engineers regarding the Cape Wind project:

The significant, long-term benefits, and the minimal and temporary short term impacts of the proposed Cape Wind project have been well described in the initial draft environmental impact survey done by the Army Corps of Engineers. My only request for the final report is that it discuss the net positive effect on the environment and our energy supply in comparison to the increased pollution and environmental degradation that will occur if nothing is done. In other words, if Cape Wind is not built, not only will things not get better, they will get worse, because more polluting old-technology fossil-fuel fired plants will need to be built instead. This is the time to begin the new era of clean, healthy, safe, secure, renewable energy.

In addition, I ask the Corps to consider the following thoughts when making its final impact study and its eventual final decison. The objections to this project that have been raised by a small number of disproportionately vocal people have basically centered around the following four areas: 1) The impact to views and property value, (2) the private use of public waters, (3) a "too hasty" review process, and (4) the "difiling" of a pristine wilderness. Even objections other than this, when examined more closely, generally turn out to be only thin disguises for the four mentioned previously. Therefore I would like to submit a few thoughts in response to these objections.

1) Property value: As mentioned in the draft EIS, there has been no proof of decline in property value of property in the vicinity of other wind turbines. The property values in Hull, MA, near the on-land wind turbine have increased, as have those near Denmark's Horns Rev and other facilities. In addition, many of the people who wish to protect the views are owners of private beachfront property, simply looking out for their own self-interest. They claim to be against allowing public water to be used for private use, but if that is the case, then, as Jay Wickersham writes in his article (which I urge the Corps to read), titled "Sacred Landscapes and Profane Structures: How Offshore Wind Power Challenges the Environmental Impact Review Process," "Why should the Commonwealth of Massachusetts protect views from beaches that Massachusetts citizens are not allowed to walk on?"

2) Private use of public waters: Those objecting to Cape Wind on these grounds ignore the fact that the public waters of Nantucket Sound are already used constantly for private commercial gain, such as fishing, lobstering, tour boating, and ferrry services. Many of these activities are also much more damaging than the construction and operation of the wind park will be. They also ignore the permitting process (which has been unduly expedited in some instances) to allow for private drilling for oil and/or natural gas, or for the mining of coal or harvesting of timber, on public lands. These activities are infinitely more damaging than the wind park would be, and only serve to continue our dependence on limited, damaging, and polluting fossil fuels.

3) "Too hasty" of a permitting process: Those objecting on these grounds ignore the fact that the review process has been one of the most thorough and painstaking that has yet been undertaken. In addition, those who claim that no project should go forward until a set of ideal standards for review of offshore wind parks are in place, ignore the fact that there is a first time for everything, and if we wait for the perfect process (or the "perfect" site - and the Horseshoe shoals area does appear to be the optimal site of the 17 studied), we may wait for years, and we as a commonwealth and as a nation are already too far behind in terms of initiating new sources of renewable energy. As Mr. Wickersham writes, "This has not been a 'limited' or 'inadequate' review; in my experience, the review process for the Cape Wind project is the best recent example in Massachusetts of a NEPA/MEPA review that has fulfilled its core functions of public input and informed agency decision-making."

4) "Defiling" a pristine wilderness: Those posing this objection hope that we, and you, will ignore the fact that Nantucket Sound is not a pristine wilderness, but rather a beautiful, but already human-impacted area, due to the fishing, lobstering, tour boating, ferrying, and day boating done there. Boaters in the Sound report regularly seeing oil slicks on the water from the many oil-spilling 2-cycle engines used in the area. Mr. Wickersham describes in his article a perspective I share and would like the Corps to consider as it makes its final report and decision. He writes, "One [group's] alien (meaning an 'intruding' structure in this case) is another [gorup's] icon. In the late 19th century, a community of 300 concerned citizens organized themselves to try to protect a particularly well-beloved landscape from a large-scale industrial intrusion. A landscape "without rival in the world" would be "profaned" and subject to "dishonor" due to the construction of a "ridiculously tall tower," which they characterized as "the grotesque, mercantile imanginings of a constructor of machines." The iconic landscape was the city of Paris; the alien [structure] was the Eiffel Tower. . . . And yet the alien has become an icon: today the Eiffel Tower is the most recognizable and best loved symbol of Paris."

And it does not take a generation for structures of beauty and function to become positive icons. Civic pride abounds in the Danish communities near Horns Rev over its existence, and tour groups from the United States have been known to make the journey to see it. Anyone who has seen the ugliness and devastation of an oil spill (which have happened in Nantucket Sound), the ugliness and pollution of oil derricks or of the act of blowing the top of a mountain into the nearest stream to get at the coal, will agree that wind turbines are beautiful, not only by comparison, but also in their own right. Modern wind turbines have been called "the breeze made visible," and have a sculptural beauty, not only in their physical form, but also in what they stand for. They look like beautiful pieces of modern sculpture, turning quietly, symbolizing a new, responsible energy freedom we can be proud of, taking us to the future and at the same time connecting us with our past, when we lived in greater harmony with the natural world.

Over 200 years ago, Massachusetts led the way in establishing independence for this country, at a time when many weren't sure it could be done or that they were ready for it yet. Now, once again, Massachusetts has the opportunity, and the responsibility, to lead this country to a new type of independence - independence from foreign oil and from the potentially devastating long-term impacts of reliance on polluting and finite fossil fuels.

I urge the Army Corps of Engineers to approve the Cape Wind project in order to make this vitally important opportunity a reality. Thank you for your commitment and diligence.

Sincerely,

Bryan Sheehan
269 Cordaville Road
Southborough, MA 01772

Finally, those voicing this objection also hope that we will ignore this fact: our choice is not between wind turbines and an empty, untouched Sound; it is between wind turbines and devastating increases in pollution, environmental and health damage, and foreign fossil fuel dependence.

Adams, Karen K NAE

From: Emichaud0329@cs.com

Sent: Wednesday, February 23, 2005 10:48 PM

To: Energy, Wind NAE; mepa@state.ma.us

Cc: info@capewind.org

Subject: LETTER SUPPORTING CAPE WIND, from summer Marion, MA resident

004579

Dear Ms. Kirk-Adams, Ms. Herzfelder, and Colleagues,

My family and I have been sailing on Buzzards Bay every summer since 1967, from the family's second home in Marion, Massachusetts. I value the beauty of the South Coast and Cape Code above most other places on earth.

The Cape Wind project is one of the best ways I can think of not only to preserve the pristine beauty of the Cape and Buzzards Bay, but to start protecting the rest of our world as well. The towers of Cape Wind, which will be a very small and unobtrusive addition to the Cape Cod and Nantucket horizons, hold the promise of helping us to start breaking our addiction to the fossil fuels that are currently poisoning our atmosphere with CO2 and numerous dangerous particulates, and making us dependent on mideast oil.

My home state of Masschusetts, a state rich in technology and innovation, should be proud and eager to build the Cape Wind project and then show it off to the rest of America and the world! We have the capacity to be leaders in the world's energy future. We must have the courage and the vision to act on the opportunity that Cape Wind gives us.

I strongly urge you to give your whole-hearted support to the Cape Wind project.

Sincerely,

Elizabeth Ellen Michaud
11 Beaver Dam Drive
Westford, MA 01886

From: Matthew Budinger [info@capewind.org]
Sent: Wednesday, February 23, 2005 10:18 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004580

Dear Ms. Karen Kirk-Adams:

As an environmental science teacher and an American, I'm truly excited about the potential the Cape Wind Project has to offer. Americans use and demand more energy than any other country in the world and since we rely heavily on fossil fuels for our energy, we are also the world's biggest polluter. We pollute our air with tons of particulate matter, ozone creating pollutants, acid rain causing polllutants, and of course greenhouse gases such as carbon dioxide every year. I know air pollution is slowly getting better in our country, but we still have a long way to go if we want to begin breathing clean air and ward off potential ecological and economic disasters from global warming. In order to do this, we must demand a change.

We must start taking a stand and eliminating our dependence on dirty fossil fuels, that not only affect our health and environment, but also make us rely too heavily on risky foreign oil. It doesn't have to be this way. We need to start using our brilliant potential as a country and captalize on new technologies and alternative energy sources to help rid ourselves of our fossil fuel dependence. This can't happen overnight, but the Cape Wind Project is an excellent opportunity for the State of Massachusetts and the country to set a great precedent.

I know many people are upset with the idea of having wind turbines affect their ocean views or potentially kill birds and/or other wildlife. But the US Army Corps of Engineers has said that wildlife deaths especially from birds will be extremely low and it will be difficult for people to see the turbines from the shoreline. I don't know about other people, but I would much rather look at wind turbines than ugly, dirty fossil fuel burning power plants. I think this idea is wonderful and I believe Cape Cod is an excellent location for our nation's first offshore wind farm. I hope the US Army Corps of Engineers, politicians, and public allow this great project to begin and I hope our elected officials will continue to press for alternative energy projects like this one.

Sincerely,

Matthew Budinger

Sincerely,

Matthew Budinger
1808 Rambling Ridge Lane
Apt 202
Baltimore, MD 21209

Adams, Karen K NAE

From: William Matthews [wcm60@cox.net]
Sent: Wednesday, February 23, 2005 10:26 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004581

Dear Ms. Karen Kirk-Adams:

I support the effort to build a wind farm at Horshoe Shoal off Cape Cod. We need a clean source of renewable energy now and this project is one small step in that direction. I want you to support this project as well.

Sincerely,

William Matthews
26 Mosher Drive
Barrington, RI 02806

cc:
Capewind

Adams, Karen K NAE

From: Kim Robinson [krobinson67@yahoo.com]
Sent: Wednesday, February 23, 2005 10:26 PM
To: Energy, Wind NAE; anne.canaday@state.ma.us
Subject: OPPOSITION TO CAPE WIND PROPOSAL

004582

To Whom it Concerns:

I am a fourth generation Cape Codder raised in Popponesset. I spent 37 years watching developers build on every square inch of soil. I watched the man-made poppy bay and canal fill with sedement because even the highest taxes couldn't pay for the constant dredging required to keep the canal and bay deep enough for the boat traffic that's quadrupled since my childhood. The Cape has already been overdeveloped and overbuilt. Now, we're solving energy shortages by building out into the ocean. What's next? In order to supply energy now for all of the overdeveloped land, we're going to develop the ocean???? We're destoying all that made Cape Cod a treasure.

This is not a "not in my backyard" argument. Rather, this is about realizing that this proposal could negatively impact all of Cape Cod. How much of Massachusetts' travel and tourism revenue come from Cape Cod???? As someone pointed out at the hearing, "Tourists won't pay to look at 130 enormous generating structures. They won't come to look at the 500 flashing lights of an industrial plant. They won't come to see the destruction 40,000 gallons of transmission oil" if/when an accident occurs.

How will fisherman, ferry and airplane operators, and pleasure craft operators be affected? And environmental affects...we have little to no information about marine turbines and the affect they might have on marine and birdlife.

They say that the Nantucket Sound is a national treaure...it's more than that. It's the heart and soul of cape cod and of Massachusetts.

It is clear that wind power will help provide alternatives for energy and it is a welcome solution. But I am gravely concerned that Cape Wind does not have the State's best interests at heart. The bottom line is that this company stands to gain quite a bit financially.

"Neither the federal government nor the state have established ground rules with respect to the private use of private development of public waters for purposes of wind energy generation. The lack of a national policy for projects of this kind in offshore waters has led us to a modern day gold rush similar to 1849 with today's offshore waters being staked out by prospectors of potential sites for more claims for wind farms." This can NOT be how we approach an area that needs our protection and thoughtful care.

I would like to support the DEIS on the Cape Wind Project, but until the science and analysis is sound and the research complete, I cannot.

Kim Robinson
Popponesset/Mashpee Cape Cod

Adams, Karen K NAE

From: Glenn D'Alessio [info@capewind.org]
Sent: Wednesday, February 23, 2005 11:12 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004583

Cape Wind provides for a clean environment, much cleaner than burning the coal required for the power cape wind could provide. The coal would do more to obscure the views through smog and particulates that also cause asthma and premature deaths than would the wind towers. This is the MA issue I feel most strongly about, and feel betrayed by my two Senators if they do not support this most important life saving and economy boosting project.

Sincerely,
Glenn D'Alessio

Sincerely,

Glenn D'Alessio
304 Longhill Rd
West Brookfield, MA 01585

cc:
Capewind

Adams, Karen K NAE

From: Brian Crounse [bcc@alum.mit.edu]
Sent: Wednesday, February 23, 2005 11:17 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004584

Dear Ms. Karen Kirk-Adams:

I have reviewed the USACE DEIS in some detail. I was impressed by the thoroughness of the report, in particular Sections 3 and 5.

After keeping an open mind for the past couple of years, I have reached the conclusion that the Cape Wind project is very desirable. The net impact of this project, which I define as the benefits of additional economical electrical generation capacity vs. the project's environmental impacts, appears to be quite beneficial.

It appears that the main concern of those opposed to the project that I feel has much legitimacy is the aesthetic impact of the turbines. Everyone is entitled to their opinion, but I can only report by how pleasantly surprised I was when I first came across terrestrial wind farms in Germany and France during recent travels. Far from an eyesore, the arrays of turbines seemed to me to be more like kinetic sculpture. I realize that others will disagree, but I found these wind farms to be quite attractive.

I do hope that those government officials in a position to influence the outcome of this project evaluate it with an open mind, in a careful and deliberate manner.

Regards,

Brian Crounse

Sincerely,

Brian Crounse
76 Coburn Hill Road
Concord, MA 01742

cc:
Capewind

From: Vinaya Saksena [info@capewind.org]
Sent: Wednesday, February 23, 2005 11:23 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004585

Dear Ms. Karen Kirk-Adams:

To whom it may concern,

I am writing in support of the Cape Wind Project. As someone who is deeply concerned about our environment, I feel that this project definitely deserves pursuit.

I understand that there are some concerns as to the aesthetic effect this project might have on the Cape, and having been fortunate enought to vacation on the Cape many times as a child, I understand this concern. I in fact feel that aesthetically, these turbines could conceivably even develop a pleasant regional association with Cape Cod, kind of like the lighthouses that have become synonymous with the land.

Furthermore, the benefits of this project can hardly be overestimated. Part of what keeps the Cape a beautiful and desireable tourist/ retirement spot (my aunt and uncle have recently retired there) is clean air and water. Anything that can be done to prevent harmful pollutants from entering the air and sea in the area should be done. Thank you.

Sincerely

Vinaya Saksena

Sincerely,

Vinaya Saksena
64 Seymour Street
Warren, RI 02885

cc:
Capewind

Adams, Karen K NAE

From: Susan Abbott [sswabbott@rcn.com]
Sent: Wednesday, February 23, 2005 11:27 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

Dear Reader,

004536

Sincerely,

Susan Abbott
60 Otis St.
Needham, MA 02492-3422

cc:
Capewind

Adams, Karen K NAE

From: Susan Abbott [sswabbott@rcn.com]
Sent: Thursday, February 24, 2005 1:03 AM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

February 24, 2005
To agency and legislative readers,

I think it is imperative that the Cape Wind Project of Energy Management Inc. be granted the permit to install wind turbines in Nantucket Sound. Because I believe we are living in the midst of "climate change" and not just anticipating it, I think we must find alternatives to fossil fuels. Thus, I practice new habits. I am lucky enough to have been able to buy a Prius car which I treat as a working car, in that I give rides to lots of people just to keep them out of their more polluting cars, and alternately, I try not to drive it very much. I walk to do my errands in Needham. In addition, I shovel instead of using the snow blower. These are only a few ways I've changed my habits to avoid adding more CO2 to the atmosphere. This new way of thinking is a daily, self imposed intrusion that has some pleasures to it. I socialize more, stay fit, and feel satisfied when I think of new ways to not use an engine or burner.

What disturbs me is that after the reasonable concerns about constructing the wind farm were studied: the unintended consequences to air quality, fishing, birds, noise etc. etc., it still finally is the view, the appearance of the wind turbines that is the final argument against the project.

Ever since I saw the DOE-NASA wind turbine on Block Island many years ago I was in awe of the shape and the size of it. It drew people to it, and was quite a tourist attraction. Since then I've stood under the wind turbine in Hull, and passed by 3 such wind turbines on the coast of Estonia last summer. Fortunately, I thought them beautiful.

I wish the people who oppose Cape Wind could change their habits of viewing. How outrageous that they think it is "their" view and should remain perpetually the same, as the world changes. Over time, smoke stacks and oil spills and lung x-rays are things we've gotten used to viewing. There are better sights that can be healthier too. I hope health trumps real estate and views.Let them see the wind turbines as Christo art installations that have been provided by a private developer who has taken a huge risk to usher our small state into the next step in energy evolution. It would be powerful for Massachusetts to be a leader in alternative energy! It would be good for commonwealth health and business. Regulations come after a project is successful, and the comprehensive study by the Army Corps of Engineers indicates success. Let the wind turbines be built.

Sincerely,

Susan Abbott
60 Otis St.
Needham, MA 02492-3422

Adams, Karen K NAE

From: Matthew Moreau [matthewmoreau@yahoo.com]
Sent: Wednesday, February 23, 2005 11:48 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004587

Dear Ms. Karen Kirk-Adams:

I am a resident of Kingston Massachusetts. The DEIS report struck me as overwhelmingly thorough. While I do not feel qualified to comment on the particulars of economic or environmental impact, I am a visual artist by trade, so I would like to comment particularly on the appearance and visual design aspects of the project.

One of the great fears of the opponents of this project is that it will "industrialize" the sound. There is a certain intangible purity to the Cape, which some feel may be altered fundamentally and for the worse by the erection of 417 foot turbines. I happen to share some apprehension as to the scale of the turbines, however, I do feel that the project avoids the essentially negative aspects of "industrialization".

A sailboat is a man-made vessel, containing man-made parts, not necessarily native to the ocean upon which it sails. It avoids the stigma of "industrial" machine partly due to nostalgia, but more importantly, because it is a tool which works in relative harmony with the environment. The boat's hull is shaped to pass through the waves smoothly, the sail fills with the wind when needed, borrowing energy to propel the boat. A sailboat is commonly agreed to be an object of beauty.

Some consider beauty to be a subjective, human construct. However, our notion of beauty has evolved from the natural world. A falcon, descending through the air, an elk leaping over a six foot high deadwood pile, the shape of a leaf... All these things are testimonials to the wonder of the myriad of solutions to the problems of survival. The adaptations which are most successful are well suited to their environment, they are sustainable and they are diverse.

Conversely, the ugliness associated with many industrial sites, such as coal powered fossil fuel plants, derives from their very lack of sustainability. The short sighted expenditure of energy, in direct conflict with the environment and the survival of many organisms around them, makes these plants ugly. If the smoke which belched from those stacks were filled with life sustaining elements, we would perhaps enjoy their look more. Unfortunately their toxicity prevents any fondness from developing, and rightly so. These are poor adaptations, providing short term gains at long term costs.

There is an inherent aesthetic to all things designed for the wind, a smooth, aerodynamic form which is pleasing to the eye. A sailboat has this, wind turbines have it, as do jets (and bombs). A bomb can be an incredibly destructive device, yet many have the outward appearance of a well polished jewel. A sword's purpose dictates a certain form, not unpleasing to the eye, yet its use betrays a brutal function. When such destructive objects can seem outwardly beautiful, the only true measure of a design's beauty is its final impact. In the case of Cape Wind, that impact is positive. Providing a sustainable alternative to fossil fuels is a clear environmental benefit. Diversifying the energy sources available for New England residents is a survival benefit which will make our economy stronger and more adaptable to sudden changes.

The benefits of Cape Wind give it a beauty that is lacking from other industrial sites.

If it is carefully and responsibly erected, those benefits will, over time, charm even the staunchest opponents. Eventually they may look upon the turbines with the same warmth of feeling as a well built sailboat on a sunny day.

Sincerely,

Matthew Moreau
11 Summer Street
Kingston, MA 02364

cc:
Capewind

Adams, Karen K NAE

From: Tyler Neill [info@capewind.org]
Sent: Wednesday, February 23, 2005 11:49 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

To me, the underlying motivations at the root of resistance to the Cape Wind project appear to be 1) the altered view and 2) the dangers posed for the tourism industry.

004583

1) The View:
It is important to note that for people who do not live on Nantucket Sound, it is rather easy to brush off aesthetics issues in favor of the "larger picture," environmental benefits for the area and the glove, etc. The residents are well justified in wanting to preserve their picturesque seascape. However, perspective sketches of the relative sizes of the windmills as compared to familiar landmarks indicate that the monopole turbines are hardly an eyesore. The community somehow became acclimated to the Canal power plant stacks, at 500 feet tall. (Perhaps these would be removed in the future...) In any case, It is simply unreasonable to insist upon preserving the status quo when there is a clear need for additional energy in the Cape's near future as well as air problems caused by the current, polluting, fossil fuel burning energy source.

2) Tourism:
It is rather difficult to imagine a would-be tourist reconsidering a trip to the cape because of off shore windmills. A large number of people would have to feel strongly enough about the small alteration of the view to significantly affect tourism on the Cape at all. Besides, the precedent has already been set in places such as California and Denmark, which actually experience increases in tourism due to wind farms.

Other, more technical arguments against the Cape Wind project seem to be constructed around these two more personal issues.

Sincerely,
Tyler Neill

Sincerely,

Tyler Neill
58 Plympton Street
Cambridge, MA 02138

cc:
Capewind

From: Harriet Schley [hwschley@aol.com]
Sent: Wednesday, February 23, 2005 11:50 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004539

Dear Ms. Karen Kirk-Adams:

I am strongly in favor of the Cape Wind Project . I am aware of the esthetic concerns, but replacing oil power etc. with wind power seems a more important consideration.

Sincerely,

Harriet Schley
484 Scraggy Neck Rd/
Cataumet, MA 02534

cc:
Capewind

GLEN A. BERKOWITZ
57 EAST CONCORD STREET
LOFT #8
BOSTON, MA 02118
glenberk@aol.com

004590

February 24, 2005

Karen Kirk Adams
Cape Wind Energy Project
EIS Project Manager
Army Corps of Engineers
New England District
696 Virginia Rd.
Concord, MA 01742-2751

Subject: Cape Wind

Dear Ms. Adams:

The United States needs to get serious about renewable energy, something much of Europe and many other countries are already doing. Harvesting the wind to make energy should play an important role in our renewable future.

Massachusetts and New England need to develop a mix of both large and smaller scale offshore wind projects. My support for Cape Wind is rooted in that context. Over the past year, I've attended most of Cape Wind's public hearings, listening to tens of hours of public testimony. I have also read most of the commendable DEIS document. I also recently had the privilege of spending some time with Jim Gordon, President of Cape Wind Associates. Not only is his project worthy of our support, but Mr. Gordon is a first-class individual who sincerely would like to deliver a better, cleaner environment to the children of tomorrow.

I therefore urge you to support what Cape Wind is trying to accomplish.

[signed]
Glen A. Berkowitz, Esq.

Adams, Karen K NAE

From: Katherine L. Scott [kscott@cape.com]
Sent: Thursday, February 24, 2005 12:52 AM
To: Energy, Wind NAE
Cc: comments@saveoursound.org
Subject: Fwd: Cape Wind Proposal

004531

From: "Katherine L. Scott" <kscott@cape.com>
Subject: Cape Wind Proposal
Cc: comments@saveoursound.org

Dear US Army Corps of Engineers: Last February the comments of mine at the end of this letter were published the Cape Cod Times. In addition to those comments, I would like to submit the following points for inclusion in the official record of public commentary to Cape Wind's proposal to erect a power plant in Nantucket Sound consisting of 130 large wind turbines:

I support the proposal put forward by Reps. Turkington and O'Leary to call a moratorium of at least a year on making a binding decision concerning Cape Wind□s application for permits to construct a power plant in Nantucket Sound.

I object to the project as currently conceived, and to the process whereby permits may be given out before all the project□s ramifications have been adequately discussed and understood. Quite apart from outstanding environmental and navigation issues, I question the wisdom of the Cape Wind project primarily from a business and commonsense point of view.

1. Wind is a relatively low-intensity energy source (compared to, e.g., fossil-fuel energy, hydroelectric power, ocean energy). Does the low intensity of the energy source justify the high-input, high-overhead, multi-acreage plant installation, which seems to follow the centralized-energy-generation model of high-intensity energy sources? It may be more logical to disperse energy generation capacity from wind over multiple smaller installations, for example, on a municipal basis, as in Hull (and as planned in Falmouth) and to distribute directly to local end-users.

2. Has it been demonstrated that the Cape Wind power plant project is genuinely "sustainable," in the original sense of this word? Will it yield more energy than that used to construct the plant? In other words, will it yield net energy, more energy than all the energy inputs required to build and run it? ALL the energy inputs required to plan, construct, erect, and maintain the turbines and distribute the energy generated must be counted. I have read that we now use 10 calories to produce one food calorie on the grocery store shelf; it may be that more than one kilowatt is needed in inputs to produce one kilowatt from wind from a large installation such as that proposed. Does the Nantucket Sound Wind Power Plant pass this basic

energy-accounting sustainability test.

3. Is there any guarantee that Cape Wind will stay around to manage the power plant once the company has harvested the available government subsidies for "green" energy?

4. If we are worried about terrorists attacking us here on Cape Cod--and apparently we are, judging by the measures that the Steamship Authority is obliged to take--is it sensible to put an outlying element of our national electricity grid offshore, where it is vulnerable to and perhaps even a magnet for attack? Will it need to be watched and guarded? Could all or part of the area eventually become a military "no-go" zone, a la Otis and Noman's Land?

5. Does the Cape Wind Power Plant proposal represent a genuine positive value to the public and especially the residents of Cape Cod as a source of cheaper, low-impact energy, or does its prime value reside in its being a feel-good symbol of our collective good intentions vis-a-vis energy policy, one that does not require that we actually rethink and change our patterns of energy generation, distribution, and use?

Cape Wind□s application for permits to install a power plant in Nantucket Sound should be seen as a wake-up call to the region, the Cape and Islands region at the least, and the whole New England region at the best.

The Cape Wind proposal has filled the planning vacuum and has in a sense become the only alternative-energy plan on the horizon.

The idea of placing 130 turbines in Nantucket Sound is in itself not a strategic plan. Cape Wind is not a planning body. The U.S. Army Corps of Engineers is not a planning body. We must not--we cannot--wait for someone else to do our planning for us. The money and the initiative are not going to come from anywhere else besides ourselves. We have the brains here on the Cape and in Massachusetts. We must act in our own behalf and that of the nation to start a genuine energy planning process.

I urge the Cape Cod Commission and the Martha□s Vineyard Commission to work with other planning bodies, including the Cape Light Compact, to develop a genuine strategic energy plan incorporating the features we wish to see: local control and local benefits, aggressive conservation and energy accounting, efficient distribution, sensible deployment of technologies according to the intensity of the energy source, and the development of new technologies such as electricity from higher-intensity sources--waves, currents, and tides. Only within the context of such planning can the true benefits and downsides of Cape Wind□s proposal--the necessity of the Nantucket Sound power plant--be assessed and convincing arguments made either FOR the proposal or AGAINST it and FOR something else.

Yours truly,
Katherine Scott
129 Hamlin Avenue
Falmouth, Mass. 02540

Can we live in harmony with wind farms?
Public ownership would ease many wind energy concerns

From the Cape Cod Times, February 1, 2004
By Katherine Scott
How ironic that corporate energy interests have been allowed to define the debate about the Nantucket Sound wind power installation: If you are for renewable energy you have to be for the Cape Wind Associates' mega-project, and if you oppose it you must have NIMBY syndrome or not be a real environmentalist.

Then some arrows from both pro and con quivers are loosed at people who drive SUVs. Meanwhile people in both camps drive SUVs

One reason we are having so much trouble grappling with this project is that we are dealing with a corporate entity we distrust and a deregulatory environment that seems tailor-made to suit wildcat energy brokers.

Many people object to the idea that public space - Nantucket Sound - should be developed by a private corporation that will "harvest" the renewables in our own "oil patch," and then sell the power back to us, the price to be negotiated. Furthermore, energy conservation seems to play little role in the development of corporate renewables.

What is good for the bottom line of private developers - energy brokers such as Enron and their investors - may not be the best deal that can be made for the public and the environment. If there is money to be made in renewables - in energy generally - why shouldn't communities make it? One way for Cape communities to gain decision-making and planning control of their energy future would be to form a publicly owned utility (POU).

Many Americans don't realize that there are 2,000 publicly-owned power companies in this country. Most of the rest are investor-owned utilities (IOUs). The chief difference between IOUs and POUs is that the former exist to make money for investors, whereas the latter are not-for-profits that exist to provide electricity efficiently and inexpensively to consumers.

According to the American Public Power Association, IOUs charged 20 percent more than POUs in 2001. Furthermore, California's 2001 rolling blackout and price-gouging nightmare didn't impact cities with POUs, such as Los Angeles and Sacramento. In fact, a number of communities that have initiated the process to create POUs have done so in response to that mess, and also deteriorated distribution lines and outages. Sound familiar?

From the APPA's web site (www.appanet.org) you can find out who their members are (about 40, including Braintree and Taunton, are in Massachusetts); what the process is whereby communities and regions create a POU; what the advantages (now enjoyed by 15 percent of Americans) of a POU are to consumers, businesses, and municipalities; and how diverse the member utilities are.

Here on the Cape and Islands we are fortunate to have the Cape Light Compact (www.capelightcompact.org), which with its aggregated buying power has achieved significant savings for the Cape and islands. The next step might be to become not just a purchaser of energy but a full-fledged publicly owned regional utility - one with the right to develop the Cape's renewable resources, distribute the power, and sell the excess, all for the benefit of Cape and islands consumers, businesses, and municipalities.

A major undertaking indeed, but let's imagine that our own POU - let's call it the Cape and Islands Power Authority (CIPA) - was managing our energy distribution network and had applied for and been given the permits to place wind turbines in Nantucket Sound.

Once you posit local control, many issues - conservation, scale of projects, tradeoffs concerning aesthetics, and genuine long-term energy planning - fall into place in a different pattern, a more attractive one. All of these issues are related and impact one another.
Once CIPA is in charge, the basic picture, as I see it, is this:
1. Local planning targets energy self-sufficiency for Cape and islands and emphasizes a mosaic of renewable technologies and scales. There would be community-based conservation accounting of decrease in fossil fuel-based watts and BTUs consumed and renewables-based watts and BTUs created. Conservation is still the cheapest source of energy. A watt saved is a watt earned. (Furthermore, a watt saved is a penny not earned by corporate shareholders.).

2. The decision to emplace wind turbines is made locally. Towers may be erected on an incremental basis, for ongoing evaluation. CIPA, not a private developer, partners with private technology companies to plan and run the project. Profits flow to the communities in the form of lower rates. Excess power is sold to create an income stream. Any large installation will be under the control of the CIPA and plans for decommissioning and removal are already in place when towers are built because unsightly wind turbines are a transitional technology based on a low-intensity energy source.

3. Longer-term planning focuses on and fosters in-the-pipeline technologies: improved conservation and less intrusive, more efficient renewables technologies. Here the elephant in the corner is the ocean-potentially the most powerful renewable energy source of all. Oddly, ocean energy has remained largely under the radar for renewables mavens in this country. Go to http://www.capecodmedia.com/ccttoday.php?sid=18 5 for a good account of some local ocean-energy initiatives.

In summary:

The wind turbine array may be acceptable to the Cape and Islands community if it is under local control and benefits flow to the region; if it is planned as part of an overall energy plan emphasizing conservation and multiple types of renewables; and if it is understood as just one phase of a long-range plan to remain in the forefront of responsible energy policy and to lead by creating an innovative business model.

Katherine Scott is a freelance editor and writer and longtime environmental activist who has written on various conservation and land-use topics. She grew up on Martha's Vineyard and is a resident of Falmouth

BACK TO TOP

To whom it may concern.

My name is Kurt E. Thomsen, i have founded the company A2SEA A/S. The company installs wind turbines offshore based on a patented design originally filed by myself in 1999. Our company is the worlds by far most experienced offshore contractor in the offshore wind energy sector and with more than 182 turbines installed and more than 200 offshore repair contracts over the last three years, we have served the industry extremely well.,

On behalf of our company A2SEA A/S i have watched the abovementioned project since the beginning of 2001. On numerous occasions the Cape Wind Associates have sought our advice on issues relating to the offshore construction of wind turbines.
Particularly the concern of inflicting very low impact on the offshore environment during and after construction has been a concern for the company and as the most experienced contractor in this field we have given our input to this subject.

Our system is based on a converted freight ship, which is fitted with four legs and a large installation crane. Originally it was the idea to minimize the need for offshore equipment as much as possible in order to reduce pollution and the overall amount of traffic in the construction area. Furthermore it was important to secure that the seabed was not disturbed due to large leg penetrations, whereby we designed our legs with large pads or baseplates in order to reduce pressure on the seabed and avoid penetrations.

The vessel will also transport the turbine components in a preassembled mode, in order to reduce the amount of offshore installation needed. Thereby the installation time for the turbine can be reduced to as little as 6 hours for one vessel.
This is significantly shorter than it will take under normal circumstances using traditional tugs and barges, which will use far more time to position and jack up before the turbine can be installed. Furthermore the leg penetration of the barge will be significant as it is lifted out of the water completely.
Finally the tugs and barges will need more time due to the low weather criterias they can work in, where our vessel will install turbines in 9 foot waves, whereas a barge will not jack up or down in anything higher than 4 foot waves.
This in effect means that the installation period will last longer and thereby also increase the amount of equipment and traffic in the wind farm area, due to a large amount of mob/demob of equipment when the weather windows disappear.

Environmental Impact Statement.

I have seen and read parts of the EIA which deals with the offshore installation and maintenance of the turbines on Horseshoe Shoal and must confess that this part is both extensive and very thorough and if representative for the entire EIA, it is my impression that this is a very thorough and sincere document of which both the Cape Wind Associates and the US authorities can be proud.

In normal tender documents here in Europe where we subscribe, the offshore installation work is often much less instructive and precise – a fact we have often complained to the client and if our tender documents were equally as thorough as the draft EIA my work would be far easier.

It is therefore our impression that the EIA submitted by Cape Wind is both though and valuable to work from in the later process of tendering and actual installation of the windfarm.

Furthermore we have been in very close contact with the Cape Wind Associates throughout the last four years and have been able to see how thoroughly and fair they are in their assessment of both the site evaluation at Horseshoe Shoal and they have made quite an effort in coming over to Denmark and Britain to see for themselves how we have installed and are operating offshore windfarms.

This is a point I particularly feel the need to emphasize as we have extended exactly the same invitation to the Alliance to protect Nantucket sound on several occasions without any luck so far.

Our motives for these invitations have been clear, we wish to let people see for themselves what an offshore windfarm actually looks like. The computer generated images do not at all give the windfarms the credit they deserve. First of all the images cannot take into account the humidity in the air which is prevailing on the offshore sites regardless where in the world. Secondly the images are limited by the frame size the camera offers, and contrary to the human eye which sees the horizon over an angle of almost 170 degrees, the photographic images are depicted as a larger part of the horizon than they actually cover.

Now to tell people this is not convincing, but to see it for yourself is believing and we have put up almost 200 turbines equally as large or larger than the turbines at Horsehoe shoal and we can supply an abundance of pictures or even better a trip out there to see reality.

So far Cape Wind Associates have made the effort of doing so.

Now as I mentioned earlier our motives are very clear. We wish to let people see for themselves what we do. We know from experience that people are positively surprised when they see the windfarms in real life. One of the frequently occurring statements are that you cannot hear them and this is true, you cannot detect any noise from the turbines, not even when you are in the windfarm.

This is also an important statement, because contrary to general perception the noise is not detectable from one turbine to the other and certainly not 3 miles to shore. Any statement of the opposite is in conflict with the truth.

We have no financial interest in the Cape Wind project although we off course hope to be involved in some way or form, but as everything else in this industry we will have to be competitive to win orders.

But we wish to show our support to a project which is right, sensible and environmentally the strongest statement the USA has made over a number of decades.

We wish the Cape wind Associates all the best, and if the USACE have any questions or queries or just a desire for information please do not hesitate to contact us at our office address.

Kurt E. Thomsen

Business Development Manager

A2SEA A/S

www.a2sea.com

www.a2sea.dk

Phone + 45 75 92 82 11

Adams, Karen K NAE

From: ROBERT WILKIN [RWILKIN@CBI1984.COM]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004593

Dear Ms. Karen Kirk-Adams:

Sincerely,

ROBERT WILKIN
250 DORCHESTER AVE.
BOSTON, MA 02127

cc:
Capewind

Adams, Karen K NAE

From: Ian Todreas [ian@todreas.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004594

Dear Ms. Karen Kirk-Adams:

I wish to express my support for Cape Wind.

Millions of electricity users currently live, work, and recreate within site of electricity generation sources. This is part of the price we pay for having electricity. No one should be able to refuse the construction of Cape Wind because of aethetic concerns. That isn't fair to the people of Salem and elsewhere who must live with a power plant in their neighborhood for the sake of the greater good.

Wind energy is clean and renewable. We desperately need more sources like Cape Wind to keep our greenhouse gas emissions to an absolute minimum.

Let's keep our energy dollars in our local economy too and endeavor to become more energy and financially independent from oil and gas imports.

Sincerely,

Ian Todreas
15 Day St
Cambridge, MA 02140

cc:
Capewind

From: Mark O'Neil [dad5@adelphia.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004595

Dear Ms. Karen Kirk-Adams:

Please help support the wind farm project on the Cape. This is an important step to preserving our future and enviroment. Studies in europe have proven zero impact on visual and environmental issues. We will pay greatly for the chicken littles of our societies, please help this project become reality.

Thank you
Mark W. O'Neil

Sincerely,

Mark O'Neil
8 Hatch Mill Circle
Pembroke, MA 02359

cc:
Capewind

Adams, Karen K NAE

From: Asa Foss [info@capewind.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004596

Dear Ms. Karen Kirk-Adams:

Promoting renewable energy sources, like the Cape Wind project, is of the utmost concern for the security and prosperity of our nation. I urge you to encourage the growth of projects like this for many years to come.

Sincerely,

Asa Foss
1810 Newton ST NW
Washington, DC 20010

cc:
Capewind

Adams, Karen K NAE

From: Elizabeth Levy [lizard6478@hotmail.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004537

Dear Ms. Karen Kirk-Adams:

As a Mass resident, I am disgusted by the fact that any of my eelcted officials would be against this project. Energy independence is key to our national safety, and reducing greenhosue gas emissions is key to our global safety. The view of a privledged few should is not as important as the impact of this crucial project.

Sincerely,

Elizabeth Levy
41 Prentiss St
Cambridge, MA 02140

cc:
Capewind

Adams, Karen K NAE

From: Joaquina Gallagher [info@capewind.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004598

Dear Ms. Karen Kirk-Adams:

VOTE YES FOR THE CAPE WIND WINDMILLS

Please liberate us from the oppression of depending on the Middle East for our oil and of the danger of nuclear power. Please approve the Cape Wind development. It is about time that we start utilizing the windmill technology. If you approve this safe technology you will be helping mankind. I live very close to the dangerous Plymouth Atomic Plant so I know what I'm talking about.

The windmill towers will become the symbol of our liberty from foreign oil, from pollution and from nuclear power.

Massachusetts through our history has always been a leader for other states to follow.

Let us lead again with this non-foreign dependant, safe and pollution free energy.

Sincerely,

Joaquina Gallagher
PO Box 66
555 Washington Street
Duxbury, MA 02331

cc:
Capewind

Adams, Karen K NAE

From: Ben Greenberg [bgreenberg@butler.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004599

Dear Ms. Karen Kirk-Adams:

I am one of many who believe that much of the recent dramatic and accelerating climate warming is man-made. Its consequences are unknown, but are highly likely to be economically, ecologically, and politically disruptive if not disastrous. It is only prudent that we dramatically change the way we generate and use energy. Our increasing reliance on fossil fuels from countries in politically unstable regions would be a bad idea in the best of times. But now, especially since much of the population in the Mideast is hostile to us, relying on sources there for vital energy needs is beyond foolish.

The Draft Environmental Impact Statement concluded, unsurprisingly, that the proposal is sound. We need to increase renewable energy generation at any reasonable opportunity, like this one. The objections appear to primarily come from people who feel an offshore wind farm would adversely affect their view. Not to proceed with this project will certainly adversely affect our region, our country, and the world.

Very sincerely,

Benjamin D. Greenberg, MD, PhD
Barrington, RI

Sincerely,

Ben Greenberg
77 Governor Bradford Dr
Barrington, RI 02806

cc:
Capewind

Adams, Karen K NAE

From: Roy Simoes [RSimoes@aol.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004600

Dear Ms. Karen Kirk-Adams:

I think this is the clearest example in recent memory that could be classified as a:

"NO BRAINER"

Enough power for the entire Cape, capacity about the size of a large fossil fuel power plant with little or no environmental impact, and ZERO fuel cost........

Lets get this done here with a lot more around the country so that we can shake the middle east monkey off our collective backs.....

Sincerely,

Roy Simoes
17 LeBlanc Drive
Peabody, MA 01960

cc:
Capewind

Adams, Karen K NAE

From: Kevin O'Connell [kjjoconnell@ibfmanagement.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004601

Dear Ms. Karen Kirk-Adams:

If energy is really a problem, then we have to make some compromises. The idea of solving the problem through conservation only is unrealistic. Quite frankly, if you look at the advances in building supplies, currently used for home construction, significant advances have been made that support conservation.

Our US Senators are against oil drilling in Alaska, they are against the wind farm do they expect us to bottle their own wind and use that.

The wind farm will lessen the grandeur of the Sound but as I said earlier something has to give. Build the farm contribute to the protection of the environment and get used to the new VIEW.

Sincerely,

Kevin O'Connell
25 Philips Farm Rd.
Marshfield, MA 02050

cc:
Capewind

Adams, Karen K NAE

From: Stephen Lagace [stevelag@cox.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004602

Dear Ms. Karen Kirk-Adams:

The time to return to renewable energy is now. What a great place for that return to take place; Nantucket Sound. Any visitor to Nantucket has visited the Windmill still standing on Nantucket. It stands as a reminder that wind has been and still can be ,again, an important energy supply.

I support Cape Wind's project in Nantucket Sound, and I hope you do as well.

Thank you for thinking about the health of our planet and future generations of visitors to Nantucket.

Sincerely,

Stephen Lagace

Sincerely,

Stephen Lagace
37 Perrin Ave
Pawtucket, RI 02861

cc:
Capewind

Adams, Karen K NAE

From: Joseph Sweeney [joseph.sweeney2@comcast.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004603

Dear Ms. Karen Kirk-Adams:

Like many Massachusetts residents I would like nothing better than to see a way to produce environmentally friendly, renewable energy to keep up with the pace of development and population demands in our Commonwealth. Wind power and the Cape Wind proposal seem to fit the bill perfectly; it does not produce harmful emissions, would impact wildlife (avian and ocean) and human less than the byproducts produced through fossil fuel processes and is renewable and maintanable. The project would create (or at least transfer) jobs so the net effect is negligible here and the impact on tourism a red herring; you cannot hnoestly believe or say with any credibility that people will stop coming to the Cape becasue of this project.

The only real opposition originates with the billionaires and millionaires who inhabit Nantucket that don't want their view spoiled. They are all for clean renewable energy sources as long as it's somewhere else, say Western Massachusetts or the Berkshires where "other" Massachusetts citizens have lower economic and political clout.

There is an old credo that says, "Actions speak louder than words." The only thing that seems to emote from Massachusetts elected officials (98% Democrat) mouths and their elite contributors is hot air. Maybe we could harness that since it is renewable, but clean...?

Start practicing what you preach and stop using the court system and deep pockets to thwart a viable and laudable project. What a bunch of hypocrites.

Sincerely,

Joseph Sweeney
40 Prospect Street
Needham, MA 02492

cc:
Capewind

Adams, Karen K NAE

From: Lynn Nadeau [lynnnadeau@aol.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004604

Karen Kirk-Adams
696 Virginia Road
Concord, MA 01742-2752

Dear Ms. Kirk-Adams:

I support the Cape Wind Project.
If you look at the Big Picture, there are 8 possible ways of generating electricity (coal, oil, gas, solar, hydro, waste, wind, nuclear). For each of these possibilities, if you consider the impact of each in 6 ways (health impact under ordinary operation, disaster impact, waste product impact, global warming impact, direct and indirect subsidies from taxpayers, environmental impact) it is clear that wind power has the least deleterious impact.
We must start working towards the long term solution of our profligate using of resources!
Lynn Nadeau

Sincerely,

Adams, Karen K NAE

From: Bernard L. Short [berniesh@bellsouth.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004605

Dear Ms. Karen Kirk-Adams:

If the army corps of engineers has not found any fundamental problem either environmental or safety to affect the Cape Wind installation then it is imperative to let it proceed.
This is for the benefit of the entire nation and the welfare of the people.
I realize the project is a for profit enterprise and this will help us keep the profits in the United States. I would hope that most of the manufacturing will be done here.

Bernard L. Short

Sincerely,

Bernard L. Short
1706 E Fisher St
Pensacola, FL 32503

cc:
Capewind

Adams, Karen K NAE

From: matthew r. courter [courter_matthewr@hotmail.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004606

Dear Ms. Karen Kirk-Adams:

Sincerely,

matthew r. courter
10612 dixon drive south
seattle, WA 98178

cc:
Capewind

From: Martha Cochran [marthacochran@yahoo.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004607

I wholeheartedly support the cape wind project. My parents own a summer home on nantucket sound in Cotuit. I go down every summer. I believe strongly that we need to counter global warming, even if it may result in a few dead birds and some views of the turbines. I will be happy to see them as they represent clean, renewable energy!

Martha Cochran

Sincerely,

Martha Cochran
1 Freeman Road
Hanover, NH 03755

cc:
Capewind

Adams, Karen K NAE

From: annettef sawyer [fbhs@earthlink.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

Sincerely,

004608

annettef sawyer
27 oakland place
buffalo, NY 14222

cc:
Capewind

Adams, Karen K NAE

From: Noah Macy [noahsky@comcast.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004609

Dear Ms. Karen Kirk-Adams:

As a frequent visitor to the island of Martha's Vineyard and as one with family living on the island, I strongly support the offshore wind energy project for Cape Cod. Not only would this benefit the people of Cape Cod, but it would take a step in reducing our dependence on foreign sources of energy. This country is rich in alternative energy sources and the Cape Wind project is one of the most notable examples of how, with some creativity and open-mindedness, we can implement a proven source of alternative energy.
I do not believe, as some claim, that this will be an eyesore or that it will dramatically impact the sailing in the sound. Even if it were an eyesore to some people, isn't that a small price to pay for the independence it offers? If we are going to use energy like we have in the past and like we will for the forseeable future, we must be willing to do everything we can to generate that energy within our borders. If I had a good source of wind in my backyard, I would jump at the chance to install a wind turbine! It would be wasteful to pass on the natural resource that is present off the coast of Massachusetts.
For myself and the rest of Americans who enjoy using electricity, I ask that you permit Cape Wind to install America's first offshore wind fam in Nantucket Sound.
With my wholehearted support, I thank you,
Noah Macy

Sincerely,

Noah Macy
108 Abbey Dr.
Royersford, PA 19468

cc:
Capewind

From: Aaron LeBeau [aaron_lebeau@yahoo.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004610

Dear Ms. Karen Kirk-Adams:

I believe that energy independence should be at or near the top of the government's agenda at the state and federal level. Not only will the wind farm provide affordable energy to the Cape it will also help prevent furthur polution of our shores from oil spills like that which occured in Buzzards Bay recently. I think that it is extremely hypocritical to stand for enviromental protection and to not support this effort. This issue will certainly be a determining factor in how I vote in the next elections.

Sincerely,

Aaron LeBeau
99 Upton St. Apt A
Grafton, MA 01519

cc:
Capewind

Adams, Karen K NAE

From: Scott Johnson [stj@motorola.com]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004611

Dear Ms. Karen Kirk-Adams:

I would like to take just a moment of your time to express my support for the proposed Wind Farm on Horseshoe Shoal. While I no longer live on the Cape, I grew up in Falmouth and regulary visit my family and spend time in the area and on the waters in Vineyard Sound.

My understanding is that the Army Corps of Engineers analysis of this project has determined there to be minimal negative environental impact. My opinion is that the benefits we as a community and our children will receive from approving and implementing this plan are compling.

I would ask that you also please support the project.

Sincerly

Sincerely,

Scott Johnson
59 Chestnut Road
Tyngsboro, MA 01879

cc:
Capewind

From: Jason Hyatt [jhyatt@whoi.edu]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004612

Dear Ms. Karen Kirk-Adams:

I am a PhD graduate student in oceanography at the Woods Hole/MIT Joint Program and I support the wind farm. The need for clean energy outweighs the need to drive around in a loud powerboat and not have to look at the wind towers. Ideally, however, I would put forward an ultimatum to the Cape and Islands: reduce our power consumption by the amount the wind farm would produce in one year, and they will not be constructed as long as this is maintained. Then the 'Save Our Sound' folks could focus their efforts on energy conservation! I would also keep ALL traffic out of Nantucket Shoals, include pleasure powerboats and destructive fishing practices. I realize that these conservation efforts are not realistic in our supply-minded energy policy, so we need the wind towers and face the consequences of our air-conditioned lifestyles.

Sincerely,

Jason Hyatt
49 Shady Lane
East Falmouth, MA 02536

cc:
Capewind

Adams, Karen K NAE

From: Jonathan Bonanno [info@capewind.org]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

Dear Ms. Karen Kirk-Adams:

004613

Dear Decision Maker-

Please approve this Cape Wind project, as it will be a fantastic benefit to the community and environment. Let MA lead the way in progress and smart new energy production, by allowing Cape Wind to build their Wind turbine farm in the Sound.

We will all win, for many years to come. Nation wide, states will look in envy at the Martha's Vineyard, and Cape area for thier brilliant decision to permit the wind farm.

Thanks
J

Sincerely,

Jonathan Bonanno
77 Edgartown Bay Road
Edgartown, MA 02539

cc:
Capewind

Adams, Karen K NAE

From: Rod Funston [r.funston@comcast.net]
Sent: Wednesday, February 23, 2005 6:55 PM
To: Energy, Wind NAE
Subject: wind park project on Horseshoe Shoal

004614

Dear Ms. Karen Kirk-Adams:

I support the proposed wind farm in Nantucket Sound. I would like to see Cape Cod lead the rest of the nation in making the right choice, as difficult as it may be for some, for our own and our children's future. I see no valid critisim of this plan, other than subjective, asthetic objections. However, I for one will find the site of the wind tubines turning in the distance beautiful and inspiring, a hopeful sign for the future, and I look forward to sailing near them. I suspect the effect on tourism will be positive rather than negative. People will come both out of curiosity and because of all the publicity. And they will see a technical triumph of mankind over the legacy of fossil fuel that has jeopardized our future. And they will come back again and again.

Sincerely,

Rod Funston
30 Nickerson Rd
PO Box 772
Eastham, MA 02642

cc:
Capewind